NEGOTIATING THE TRANSITION BETWEEN PRIMARY AND HIGH SCHOOL WITHIN THE CONTEXT OF TEACHING AND LEARNING SCIENCE: A CASE STUDY IN THE UMGUNGUNDLOVU DISTRICT.

By

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DECLARATION

I, Sybil Cebisile Thabethe, hereby declare that this dissertation: ***Negotiating the transition between primary and high school within the context of teaching and learning Science: A case study in the Umgungundlovu District,*** is my original work and has not been submitted for assessment at any institution for a postgraduate qualification. The sources and quotes used have been acknowledged in the text and in the reference list.

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S. C. THABETHE DATE

I hereby declare that this dissertation has been submitted for exanimation with my approval.

…… …….....

DR. M STEARS DATE

(Supervisor)

DEDICATION

This dissertation is dedicated to my beloved late mother MaKhumalo, who worked very hard under unbearable conditions to raise us to the people that we are today and my father, Bernard Sikhosiphi Shange who ensured that, in spite of all the circumstances, we were able to obtain tertiary education. To my husband, the pillar of my strength, Sicebi Thabethe and my sons Ngcebo and Sicebi (Jnr) for their support, love and understanding.

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ABSTRACT

Learners experience a variety of social and academic challenges as they move from primary school to high school. There is a need to understand learners' experiences of this transition in terms of teaching and learning Science. The purpose of this study is to explore learners' experiences as they transit from primary to high school with regard to teaching and learning of Natural Science. It does so by exploring what type of skills learners acquire in Grade Seven and are able to use in Grade Eight. The study aims to develop a better understanding of grade eight teachers' perception of what learners know and how they manage learners' transition from primary to high school Science classes.

This study is located within the pragmatic paradigm as it applied both qualitative and quantitative approaches to gather data. It is the a case study of two grade seven natural sciences teachers and two grade eight natural sciences teachers and their learners in the Umgungundlovu district. A conceptual framework consisting of a number of constructs related to teaching and learning science within the context of my study served as lens for the study. Various data collection methods were used. These were teacher questionnaires, learner questionnaires, classroom observations, document analysis, focus group interviews with learners and teacher interviews. The constructs and sub-constructs of my conceptual framework which is informed by literature was used to analyse the data collected.

The study revealed that learners experience the transition with regard to teaching and learning of Science as challenging. The factors identified as influencing the challenges range from teaching strategies of grade eight teachers to the volume and frequency of homework. These factors resulted in the decline of enjoyment of science in learners in Grade Eight as compared to the enjoyment of Science in Grade Seven. This study further revealed that grade eight teachers have expectations that learners are often unable to meet, making the transition from primary school to high school difficult for learners as well as teaches. This study concludes that teachers are not fully conversant with the subject of transition and therefore do little to support learners through this critical stage of their schooling lives. The study concludes with a number of recommendations which may assist in easing the transition for learners from primary to high school within the context of teaching and learning Science.

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1. OBE – Outcomes Based Education
2. RNCS – Revised National Curriculum Statement
3. NCS – National Curriculum Statement
4. NS – Natural Sciences
5. FET – Further Education and Training
6. GET – General Education and Training
7. DoE – Department of Education
8. CAPS – Curriculum and Assessment Policy Statements
9. HOD – Head of Department
10. IQMS – Integrated Quality Management System
11. LO – Learning Outcome
12. AS – Assessment Standard
13. NRC - National Research Council
14. LOLT- Language of Learning and Teaching
15. AAAS - American Association for the Advancement of Science
16. NRC- National Research Council
17. NSW – New South Wales
18. TIMMS- Trends in International Mathematics and Science Study
19. NBEET - National Board of Employment, Education and Training

CHAPTER 1

SETTING THE SCENE: CONTEXTUALISING THE STUDY

1.1 INTRODUCTION

In South Africa learners move from primary school to high school between the ages of 12 and 13 years, after completing their final year (Grade Seven) in the primary school, to embark on their high school (Grade Eight) careers. This transition from primary school to high school is a crucial time for learners (Jindal-Snape, Douglas, Topping, Kerr & Smith, 2006; Vinson, 2006). Research has shown that during this period learners often experience a variety of challenges including behavioural problems (Howard & Johnson, 2004) and a decline in academic performance (Northern Territory Council of Government School Organisations, 2005) due to the fact that learners now have to adjust to high school environments where the context is very different.

The focus of this study is on the transition of grade seven learners to Grade Eight within the context of teaching and learning Science. However, my research context will be grade eight learners who have moved to high school and their experiences as they adjust to the new environment in which they find themselves. To understand the problem requires an understanding of teachers' perceptions of learners transiting from primary to high school as well.

1.2 BACKGROUND

In 1994, with the first democratic elections, the government introduced sweeping changes in South Africa. (Chisholm et.al, 2000). One of the changes was in education. Through the education reform process, the intention was that learning would be more accessible to all, of better quality and relevant to all South Africans (Chisholm et.al, 2000). The education reform process began with the implementation of a new curriculum, Curriculum 2005 (C2005). Curriculum 2005 was underpinned by outcomes-based education (OBE), which emphasised the shift from teacher-centred education where learners had to memorise content, which they then had to repeat in tests and examinations, to what learners could do with their knowledge

and particularly whether they could use what they learned to meet the specified outcomes (Rogan, 2007).

Prior to 2002, South African teachers faced the dilemma of what and how to teach what was prescribed in the C2005 policy documents. One major source of difficulty for science teachers, for example, was the pronouncement that content was not important; any content could be selected at any time and at any grade level, as long as the outcomes were achieved (Chisholm, 2005). OBE was superficially implemented in primary schools where learners had to engage in activities unrelated to specified content but of importance to outcome achievement. As Jansen (1999) stated: "*This is done at a very superficial level…labelling and categorisation of classroom activities under one of the three learning programmes*" (pg.205). In some instances learners were put in groups and given meaningless activities to perform on their own without any supervision (Jansen, 1999). This widespread confusion led to the revision of C2005 and culminated in the Revised National Curriculum Statement (Department of Education, 2002).This curriculum statement (DoE, RNCS, 2002) was accepted as policy in April 2002 and introduced to schools (Grade R-9).The common aspect in all the above curricula was that teaching should be learner-centred and encompass the theories and philosophies of constructivism and outcomes-based education (OBE). Learner-centred curricula places more emphasis on the learner rather than the teacher and it encourages learners to be actively involved in learning as opposed to passiveness which characterises teacher-centred curricula. Learner-centred curricula may interest learners more and motivate them to continue with Science in high school as well as at the tertiary level. In contrast to the situation in primary schools, teaching and learning in many high schools still revolved around the teacher as the source of information (Gallagher, 1994; Speering & Rennie, 1996) making the transition more difficult as the teaching and learning approaches are different in the two phases. Research points to a similar problem in Botswana where the focus is on the development of process skills in the primary school and the lecture method is employed in high schools (Letsholo & Yandila, 2002). In South Africa we are faced with a challenge where our learners are not performing well in Science as is evident in the Trends International Mathematics and Science Study (TIMSS) (2003) science results where South African learners performed poorly compared to all participating countries (TIMSS, 2003).

I am of the view that the teaching approach in primary school differs from that of high schools and the manner in which OBE was superficially implemented in primary schools may

add to challenges that South African grade seven learners experience during transition from primary to high school. This may be especially relevant to Science, as primary science uses more concrete ideas compared to secondary science which has more abstract ideas (Stevenson**,** 1999) and teaching primary science is built on the premise that acknowledges the learners' ideas of Science which is referred to as pre-knowledge. Stevenson (1999) for example, maintains that the equipment used in primary science, as well as the methods of measuring, are simple compared to the unfamiliar, more dangerous and difficult equipment and measuring techniques used in high school. He maintains that more accurate measuring is required in laboratories or specialist rooms of the high school. Therefore it is likely that learners transferring from primary to high school science classes will be threatened by the manner in which teaching occurs in high schools.

1.3 THE PURPOSE OF THE STUDY

The purpose of this study is to explore learners' experiences as they transit from primary to high school with regard to teaching and learning of Natural Science. My study aims to develop a better understanding of experiences that grade seven learners encounter with the transition to high school in terms of learning science. In this study I will also explore teacher expectations of grade seven learners in terms of skills and knowledge they bring to Grade Eight. I also seek to find out how the skills and knowledge grade seven learners bring to Grade Eight are aligned with teachers' expectations. For the purpose of this research study my focus will be learning and teaching in Grade Seven and Eight within the context of the RNCS since the study was conceptualised before the introduction of the Curriculum and Policy Statement (CAPS), a document which attempts to streamline the RNCS and make it more accessible to teachers. Furthermore, while the CAPS has currently (2012) been introduced in the Foundation Phase, Intermediate Phase, FET Phase and Grade Nine of the Senior Phase, it was only implemented in Grades Seven and Eight in 2014, by which time my study was well underway.

1.4 RATIONALE

I intend to map learners' experiences of the transition to Grade Eight with regard to learning Science. If we are to keep learners engaged in Science and Mathematics in post primary classes we should be mindful of how learners negotiate the transition from primary to high schools in terms of teaching and learning of Science. I am of the view that difficult transitions

may result in learners disengaging from these subjects. Macintyre, Gardner, Gilling, Hughes, Parkinson and Rosemergy (2006) assert that learners' attitudes, as well as the pedagogical approach taken by teachers are some of the reasons learners disengage from Science. This disengagement is a concern to the science community since learners end up avoiding Science at tertiary level and ultimately avoid science related careers (European commission report, 2004; Fullerton, Walker, Ainley & Hillman, 2003; Lyons, 2006; Tyler, 2007). A South African study by Peloagae and Gaigher (2010) suggested that smooth transitions between primary and high school could encourage learners to choose science-based careers.

As a primary school teacher for Grade Seven I realised that grade eight teachers complain that most learners who come from Grade Seven do not cope well in Grade Eight. I also noticed that learners who left Grade Seven performing well in Natural Sciences tend to drop the science stream when they reach the FET phase. These observations prompted me to conduct this study so as to find out if it is the transition that causes the learners to perform badly in Grade Eight and get to understand why this is particularly the case in Science. I believe that if learners are not doing well in Science in Grade Eight the chances are slim that they will continue with Science in Grade Ten. Our country is in crisis with regard to performance in Mathematics and Science (Muwanga-Zake, 2000) so I am convinced that if problems are identified at an early stage it may be possible to try and remedy the situation.

1.5 RESEARCH QUESTIONS

The main objective of this study is to explore learners' experiences of the transition to high school with regard to teaching and learning of science, thus leading to the main research question:

How do learners and teachers experience the transition between primary and high school within the context of teaching and learning science?

The subordinate research questions which will be engaged with in order to answer the main research question are:

(1) What science skills do learners acquire in Grade Seven?

(2) How do learners experience the transition from primary to high school with regard to science teaching and learning?

(3) What are grade eight teachers' perceptions of what learners know with regard to Science when they enter high school?

(4) How do grade eight teachers manage learners' transition from primary to high school in science classrooms?

1.6 THE NATURAL SCIENCE CURRICULUM

The study that I am conducting is aimed at finding out how learners negotiate the transition from primary schools to high schools in terms of teaching and learning science. I saw it relevant to provide background information about the natural science curriculum. This information will help the reader understand what the national natural science curriculum of South Africa entails.

1.6.1 Aims of primary science

In South Africa primary science starts in the Foundation Phase where it is infused in the "life skills" learning area. While the RNCS provides a distinct curriculum for Natural Sciences in the Foundation Phase, the documentation describing the Life Skills Learning Programme to be taught in the Foundation Phase, makes little reference to science teaching and learning.

Natural Sciences as a discrete learning area is present in the Intermediate and Senior Phases Curriculum of the RNCS. While the CAPS documents present Natural Sciences and Technology as integrated learning areas in the Intermediate Phase that should be taught as such, Natural Science is the dominant learning area in this integrated approach of CAPS (DoE, RNCS 2012). In the Senior Phase Curriculum Natural Sciences emerge as a stand-alone learning area.

According to the DoE policy, Natural Sciences is compulsory for all learners in the Intermediate and Senior Phases. Therefore it is critical to develop and promote scientific literacy in these phases as some learners may opt not to continue with science subjects beyond Grade Nine. Natural Sciences serve a dual purpose:

It must enable learners to make sense of the world in scientific terms

Prepare learners for continuing with a science(s) into the FET phase … and beyond (DoE, RNCS, 2012 p.12).

The aims of Science are universal. In most parts of the world the main idea underpinning science teaching is to develop scientific literacy and science process skills, which are transferrable to other situations when needed (American Association for the Advancement of

Science, 1993; National Research Council, 1996). Murphy (2006) supports a similar approach when she states that primary science has three aims: 1) To develop scientific process skills, 2)To foster the acquisition of concepts and 3)To develop particular attitudes. The question is whether the South African primary science curriculum really prepares learners to make the transition to learning Science in Grade Eight? Does it prepare them to continue with Science into the FET phase and beyond? Research has shown that most learners tend to opt out from science subjects when they choose their specialisations (Bernstein, 2007).

1.6.2 The Revised National Curriculum Statement (RNCS) for Natural Sciences

The South African Constitution provided the basis for curriculum transformation and development. The need to transform South African society stems from the need to address the legacy of apartheid in all areas of human activity, and in education in particular (DoE, RNCS, 2002). Hence the introduction of the RNCS which was aimed at bringing about fundamental changes to teaching and learning in South African schools. The Natural Sciences Learning Area Statement envisages *a teaching and learning milieu which recognises that the people of South Africa operate with a variety of learning styles as well as with culturally influenced perspectives* (DoE, RNCS, 2002, p 5). The RNCS starts from the premise that all learners should have access to meaningful science learning. It advocates the paradigm shift from the traditional approach of teaching science to a teaching approach that has to be learner- centred and help learners to understand not only scientific knowledge and how it is produced, but also the contextual environmental and global issues that are intertwined within the learning (DoE, RNCS 2002). The RNCS is structured around the achievement of the following three Learning Outcomes:

LO1: Scientific Investigations

LO 2: Constructing Science Knowledge

LO3: Science, Society and the Environment

The development of science process skills and inquiry-based learning are applicable to all three Learning Outcomes (DoE, RNCS, 2002). However the LO1 is where most of the process skills are developed.

The learning outcomes as presented in the Senior Phase Policy documents are common across the GET phase. Distinction between the Foundation, Intermediate and Senior Phases are embedded in the Assessment Standards which describe the different cognitive levels for each phase. While the assessment standards are different for each phase, no guidelines are provided with regard to which content should be taught in each grade of a phase in the RNCS. However, work schedules have been developed nationally to guide teachers as to what should be taught in each Grade. Table 1.1 summarises the differences between Grade Seven and Grade Eight with regard to various aspects of the Natural Science Curriculum.

Table 1.1: Differences between Grade Seven and Grade Eight with regard to various aspects of the Natural Science Curriculum.

Core Knowledge & Concepts	**Learning activities**	**Resources**	**Assessment**
i) The concepts discussed in Grade Seven and in Grade Eight are different and the content in Grade Eight is more complex compared to Grade Seven content. ii) In grade Eight there is an introduction of new terminology For example living and non - living things now referred to as Biotic and Abiotic Factors. The differences noted in matter and materials content in Grade eight is now more abstract in nature. For example, symbols are used for	The level of complexity increases with the Grade regarding the activities done in each Grade. i) At Grade Seven level learners are required to sort, compare using observable features, define terms, draw and describe. At Grade Eight level learners also define, compare, explain, draw and explain but they are also required to demonstrate their understanding by	The work schedules reflect that the resources used in Grade Seven and in Grade Eight are not that different except in the case of experiments. The chemicals used will be different as the experiments conducted are different. For example in Grade Seven vinegar and lemon juice are used for testing acids and soap for bases whereas in Grade Eight they are now working with chemicals such as hydrochloric acid, sulphuric acid and	There are no differences between the forms of assessment used in Grade Seven and those used in Grade Eight. DoE, RNCS (2002) reflect differences in the levels of complexity in the assessment standards between Grade Seven and Grade Eight. Learners' achievements are assessed through their level of performance at higher levels. For example in Learning Outcome One, Assessment Standard One, Grade Seven learners are expected to be

chemical reactions compared to the concrete nature of separating mixtures in grade seven. The level of complexity is therefore higher in Grade Eight.	discussing differences based on prior activities, using graphs to explain relationships.	ammonia.	able to: "plan simple tests and comparisons, and consider how to make them fair" whereas in Grade Eight they are now expected to be able to "identify factors to be considered in investigations and plan ways to collect data on them, across a range of values" (p17).

1.6.2.1. Process skills identified in the curriculum.

As this study focuses strongly on process skills, it is necessary to highlight the process skills mentioned in the RNCS. These are listed in Table 1.2 below.

Table 1.2 Process Skills identified in the Natural Science Curriculum

Observing
Comparing
Measuring
Recording information
Sorting and classifying
Interpreting information
Predicting
Hypothesising
Raising question about the situation
Planning science investigations
Conducting investigations
Communicating science information

As mentioned previously, this study was conceptualised before the CAPS was developed. However, I include the process skills listed in the DoE, CAPS (2011) to show, that although the CAPS provides more detail regarding the different process skills, they are essentially the same. Therefore the findings of my study should still be relevant in the current context where the CAPS is implemented.

The following are the cognitive and practical process skills that learners will be able to develop in Natural Sciences (CAPS: Natural Sciences Senior phase, p10).

1. Accessing and recalling information – being able to use a variety of sources to acquire information, and to remember relevant facts and key ideas, and to build a conceptual framework
2. Observing – noting in detail objects, organisms and events
3. Comparing – noting similarities and differences between things
4. Measuring – using measuring instruments such as rulers, thermometers, clocks and syringes (for volume)
5. Sorting and classifying – applying criteria in order to sort items into a table, mind-map, key, list or other format
6. Identifying problems and issues – being able to articulate the needs and wants of people in society
7. Raising questions – being able to think of, and articulate relevant questions about problems, issues, and natural phenomena
8. Predicting – stating, before an investigation, what you think the results will be for that particular investigation
9. Hypothesizing – putting forward a suggestion or possible explanation to account for certain facts. A hypothesis is used as a basis for further investigation which will prove or disprove the hypothesis
10. Planning investigations – thinking through the method for an activity or investigation in advance. Identifying the need to make an investigation a fair test by keeping some things (variables) the same whilst other things will vary
11. Doing investigations – this involves carrying out methods using appropriate apparatus and equipment, and collecting data by observing and comparing, measuring and estimating, sequencing, or sorting and classifying. Sometimes an investigation has to be repeated to verify the results.

12. Recording information – recording data from an investigation in a systematic way, including drawings, descriptions, tables and graphs
13. Interpreting information – explaining what the results of an activity or investigation mean (this includes reading and understanding maps, tables, graphs). *A Translation Task requires learners to make sense of information and convert the information into a different format e.g. from information captured on a table into a graph format and or written format.*
14. Communicating – using written, oral, visual, graphic and other forms of communication to make information available to other people.

15. The Scientific Process is a way of investigating things about the world. Scientists use this process to find out about the world and to solve problems. The steps that make up the scientific process are not necessarily in order (sequential), and may include:
Step 1: Identify a problem and develop a question. What is it you want to find out?
Step 2: Form a hypothesis. A hypothesis is your idea, answer, or prediction about what will happen and why.
Step 3: Design an activity or experiment. Do something that will help you test your idea or prediction to see if you were right.
Step 4: Observe/note changes/reactions (e.g. through measuring), and record your observations (e.g. onto a table). What were the results of your activity or experiment? Write about what happened.
Step 5: Make inferences about the observations recorded in the tables, graphs, drawings, photographs. Make some conclusions. What did you find out? Do your results support your hypothesis? What did you learn from this investigation?

In chapter two I indicate which process skills will be focussed on in my study.

1.7 CLARIFICATION OF TERMS

The terms listed in Table 1.3 have been identified as pertinent to my study and are clarified accordingly.

Table 1.3 Explanation of pertinent terms used in the study

TERM	CLARIFICATION
Grade Seven	Learners in year seven of primary schooling, the final year of primary school in South Africa.
Grade Eight	Learners in their year eight of schooling, the first year of high school in South Africa
Foundation Phase	Grade R to Grade Three
Intermediate Phase	Grade Four to Grade Six
Senior Phase	Grade Seven to Grade Nine

1.8 OUTLINE OF THE STUDY

This section serves to provide a brief outline of the study chapter by chapter.

Chapter One- this is the introductory chapter to the study. It sets the tone of the research by providing the background to the study, stating the research questions, focus and purpose as well as the rationale. The South African Natural Sciences curriculum is also discussed.

Chapter Two - this chapter reviews the existing literature relating to the study i.e. transition, class room environment, assessment and teaching and learning strategies. The concepts used to frame the study are also discussed here. It attempts to present a critique of the existing literature as well as show where possible gaps in research of this topic may exist.

Chapter Three - this chapter describes the methodology applied in this study. I discuss my chosen paradigm as well as my research approach and design. My research instruments and methods of data collection and data analysis are also discussed. Issues of ethical considerations are also discussed here as well as limitations to the study.

Chapter Four - this chapter presents and discusses the findings based on the analysis of the data obtained from teacher questionnaires, learners' workbooks and assessment books as well as learner questionnaire and focus group interviews. In discussing my findings I show how my first two research questions are answered.

Chapter Five - this chapter presents and discusses the findings based on the analysis of the data obtained from interviews and classroom observations. In discussing my findings I show how my third and fourth research questions are answered.

Chapter Six - this chapter draws conclusions based on the findings and recommendations are made that may assist teachers to understand the learners better when they transit to Grade Eight with regard to learning and teaching of Science.

1.9 CONCLUSION

In this chapter I have discussed the background of South African education after 1994, and the reforms that have taken place since then. As a grade seven teacher I am interested in the way learners experience science teaching and learning as they move from primary to high school within the context of educational reform. I have attempted to show the differences in the RNCS pertaining to Natural Science in Grades Seven and Eight. The study will further seek to determine what factors outside the curriculum impact on learners' experiences of Natural Science learning and teaching as they transit from primary to high school.

In Chapter Two I discuss a review of the relevant literature pertaining to transition as well as to teaching and learning of Science in the Senior Phase. I also present my conceptual framework and explain how the framework is used as a lens in my study and how it frames my research.

CHAPTER TWO

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.1 INTRODUCTION

In this chapter I review the relevant literature related to transition from primary to high schools. A vast body of literature exists on research conducted with regard to the possible reasons why learners experience difficulties in their transition to different phases of schooling. Many factors emerge from this body of research. A number of these pertinent aspects relating to the transition of learners from primary to high school, both nationally and internationally are critically discussed. Literature shows that teacher attitudes and teaching approaches employed by teachers can also influence transition. The conceptual framework that guides the study was developed by drawing on these research findings. I present this conceptual framework and further discuss each construct in the framework. I conclude the chapter with a brief summary.

2.2. LITERATURE REVIEW

My literature review includes a discussion of what is meant by transition; it then moves to a discussion of research related to learners' experiences of the transition from primary to high school. The transition from primary to high school may be influenced by a number of factors that impact on learners' experiences in high school and these aspects are critically engaged with.

2.2.1. Transition in children's lives

Caspi and Moffitt (1991) define transition as situations which often arise from social and biological events that disturb a previously existing social balance. Green, (1997) defines transition "*as a process of moving from known to unknown"* (p.157). The Macquarie Dictionary (Macquarie University, 1982) defines transition as the "*passage from one position, state, stage, etc., to another"* (p.1835). As such, transitions are times of both continuity and change - some things change and some things stay the same (Perry, et.al, 2006). According to Demetrious, Goalen and Rudduck (2000) 'transition' refers to the move from one year to another within the same school, while 'transfer' refers to a move from one

stage of schooling and from one school to another. Transition is systemic and all learners will experience transition in their schooling careers. There are four major transitions that learners need to negotiate successfully if they are to be successful in the future. Learners go through transitions as they leave home to preschool, preschool to primary school, primary school to high school and from high school to tertiary institutions (Anderson, Jacobs, Schramm & Splittgerber, 2000). Simmons and Blyth (1987) state that the fact that a learner has successfully negotiated one transition does not mean that he or she will successfully negotiate the next one. Transitions are extremely important because they represent major shifts in the daily contexts in which children and adolescents interact. For some learners, the transition is smooth and peaceful, whereas for others it is stressful (Anderman, Missall, Hojnoski, Patrick, Drake, & Jarvis, 2009).

Within the context of schooling, transition is seen as the period in learners' lives when they start school, when they leave primary school to high school and when they leave high school to tertiary institutions or even when they go to work (Ganeson, 2006). Rice (2001) simply defines transition as a point at which learners move from one segment of the education process to another. Paloege (2009) in his study noted the four major transitions i.e. are from home to school, elementary (primary) school to middle/junior high school, middle/junior high school to high school. In the South African context three or four major transitions occur for most children, depending on whether they attend pre-schools or tertiary institutions. These are: home to pre-school; pre-school to primary school; primary school to high school.

2.2.1.1 Starting school

Starting school is an important time for young children, their families, and educators (Dockett & Perry, 2001; Pianta, Rimm-Kaufman, & Cox, 1999). The transition into kindergarten (or the Foundation Phase as it is known in South Africa), is the first major school transition; however, for some children, who already have attended child care facilities or pre-school, the transition to formal schooling may be much easier than for other children, who have stayed at home until just prior to entering formal school (Anderman et al., 2009). Pre-school and formal school settings vary a great deal in curricular content, structure, and focus. In general, pre-school settings tend to be characterised by an approach to education that emphasizes child-directed learning through play, whereas formal school settings are more likely to emphasize the acquisition of skills and knowledge through direct instructional approaches

and structured activities (Hemmeter, 2000). In formal schooling children enter a world of opportunities and challenges different from their pre-school or home environments, and their experiences in that context start the stage for continued development (Anderman et al., 2009). These changes are accompanied by changing expectations related to learning and social interaction (Anderman et al., 2009). According to Anderman et al. (2009) the transition to a formal school context is marked by important changes. Children change developmentally in ways that can support their adjustment and growth cognitively and socially when fostered in sensitive interactions with others.

2.2.1.2 Primary to high school

International literature refers to the terms elementary and middle school. In the South African context, elementary school is called primary school and middle school is part of high school which means that South African children have one less transition to deal with. Although I draw from international research, I will use the South African terminology.

The second major transition for most learners is the transition from primary to high school (Anderman et al., 2009). The transition to high school coincides with early adolescence—the developmental transition period between childhood and adulthood (Anderman et al, 2009). Research (Anderman et al., 2009; Niesen & Wise, 2004) shows that the transition from primary to high school is the most difficult and traumatic of these transitions. This transition coincides with the adolescence stage of development which is the stage where learners experience puberty. This puts added pressure on them if they have to cope with moving into a new school environment as well. The transition into high school is often problematic for early adolescents because the instructional practices of many high schools do not meet the developmental needs of early adolescents (Anderman & Maehr, 1994; Eccles & Midgley, 1989; Elias, 2001; Tokin & Watt, 2003). Transition from primary to high school has been shown to be a stressful event in the lives of all adolescents (Rice, Frederickson & Seymour, 2010).

There are indications that as learners leave the smaller, more individually responsive context of primary school to enter the larger, more impersonal world of high school, they are susceptible to anxiety, disengagement and alienation from education (Howard & Johnson, 2004). Anderman et.al (2009) assert that high schools typically afford experiences quite different from those learners were accustomed to in primary schools. Howard and Johnson

(2004) argue that, on one hand, the primary school culture emphasises care and nurturance of learners and offers a sense of belonging to learners. On the other, the culture of the high school is oriented towards teaching academic subjects, it emphasises differentiation of learners according to achievement and produces experiences of fragmentation and isolation rather than cohesion and bonding. With the help of parents and teachers, and with adequate preparation, learners may be assured a successful entrance into high school (Niesen & Wise, 2004).

It is the transition from primary to high school that is the focus of this study and the factors that influence children in this transition is therefore of primary importance. Nevertheless, I will briefly discuss the transition from middle to high school in other countries as it points to the different and/or similar problems early adolescents and older learners' experience.

2.2.1.3 Middle to High school

According to Barber and Olsen (2004), high school students (FET learners in the South African context) have been assumed to have fewer problems than middle school students (Grades seven and eight learners) given that they have had experience with middle school transitions and are more mature than early adolescents, all of which makes them less vulnerable to peer influence. However Anderman, et al. (2009) argue that these assumptions are incorrect, as high school students in middle adolescence also experience significant stressors as they strive to meet the challenges associated with school/grade transitions. Barber and Olsen (2004) assessed transitions to middle and high school in the same learners and found that, although high school learners reported fewer negative changes than they had two years earlier in middle school transition, the types of problems reported were consistent across both school transitions. According to Anderman et al. (2009), in most high schools, the structure of classes is also potentially problematic for adolescents in that classes are even less decentralised than in middle school, leaving students without clear connections to caring adults who know their academic and social strengths well.

2.2.2. A closer look at learners' experiences of transition to high school classrooms with special reference to Science

Research discussed above has highlighted the fact that globally transition from primary to high school is problematic for many children. This may result in them experiencing a

downward spiral in their performance in the first year post transition. "*This period is regarded as one of the most difficult in pupils' educational careers, and success in navigating it can affect not only children's academic performance, but their general sense of well- being and mental health"* (Zeedyk, Gallacher, Henderson, Hope, Husband & Lindsay, 2003, p.68). Learners have to adapt themselves to these changes which are associated with transition. For instance, high school learners move from one class to another in a single day, experiencing changes in subject matter, teachers, instructional methods, and classmates. Likewise, as learners progress from one level of education to the next, they may experience major changes in school climate, educational practices and social structures (Rice, 2001). The reviewed literature shows that there are many issues that influence the transition as learners move from primary school setting to high school setting. Learners entering high schools face many challenges including academic and curricular changes. Problematic aspects of transition can be classified as academic or social, most of which result from the dramatic changes that occur as learners move from primary to secondary school (Mackenzie, McMaugh & O'Sullivan, 2012). A holistic approach is required to facilitate the transition from primary to high school. The success of the transition will depend on the following: the importance of the impact of a child's internal attributes, family, peers, school systems, professionals and community (Jindal-Snape & Foggie, 2006).

Ainely (1995) found that learners in secondary schools had less favourable attitudes towards school than primary school students; this was particularly the case for curriculum related aspects. High school is different from primary school and the change in curriculum in high school may become a source of anxiety (Meece, 2002). There is considerable evidence that the science curriculum in Australian secondary schools is driven by the perceived need to impart knowledge to learners (Speering & Rennie, 1996). However primary science is hands-on and aims to provide practice in problem-solving skills (Murphy, 2006; Rennie, 1984). Jarman (1990) reported that students experienced such a large number of changes in the teaching and learning of Science between primary and secondary school that they barely recognised it as the same subject. I believe that another difference between South African primary and high schools is that in many primary schools a thematic approach is adopted which results in integration across learning areas, whereas in high schools teaching is individualised and specific to that particular learning area/subject. Cotterell (2002) asserts that high schools favour subject-based curricula, compared to a thematic, interdisciplinary approach adopted in primary schools. A study by Gallagher (1994) found that primary

teachers made curricular decisions based on subject integration and the need of the learners, whereas secondary teachers were content, and saw themselves as information givers. This lack of integration between learning areas and compartmentalisation of knowledge experienced by learners at high schools is an additional challenge (Beane, 1991, Cumming, 1996).

Homework is another area of concern in the transition between primary schools and high schools. The amount and frequency of homework given to learners in high school far exceed that of primary school. Coping with the academic work of high school and the expected increase in homework was identified as a concern by parents and learners alike (Akos & Galassi, 2004; Howard & Johnson, 2004; Zeedyk et al., 2003).

Previous research shows that positive attitudes towards Science decrease throughout the school years and particularly during the transition from primary to high school (Anderman, 1996, Baird & Penna, 1992; NBEET, 1993). According to a study conducted by Speering and Rennie (1996) on learners' perceptions of Science during transition to secondary school, their results indicated that year seven learners expected secondary school science to be more exciting, fun, hands-on and challenging. Many of those learners who had enjoyed Science in primary school expected that they would continue to enjoy it for those reasons. Instead, most learners in their study were generally bored with their science lessons, and had failed to create strong relationships with their science teachers. The reality is that for many learners beginning high school, science lessons involved lectures, note-taking exercises or working from a text (Speering & Rennie, 1996).

A study by Peloagae and Gaigher (2009) reveal that transition is not only a problem between primary and high school but also within the same school from the GET to the FET phase. This coincides with international findings on transitions between middle and high school mentioned above. Peloagae and Gaigher (2009) are of the view that smooth transitions between primary and high school could encourage learners to choose scientifically based careers. I argue that if a smooth transition can be ensured between Grade Seven and Grade Eight in terms of acquiring science skills and knowledge, learners would not have to experience the difficult transition from the GET to the FET phase. Unsuccessful primary to high school transition can lead to learners' change of attitude and perception of Science and their ultimate disengagement in science subjects (European commission report, 2004;

Fullerton, Walker, Ainley & Hillman, 2003; Lyons, 2006; Macintyre et.al, 2009; Tyler, 2007). In the United Kingdom, post-transfer regression seems to be worse in Science than in English or Mathematics (Galton, Gray, & Ruddock, 1999). Research by Hargreaves and Galton (2002) on secondary classrooms suggests that pupils' concentration decline more in Science than it does in either English or Mathematics.

2.2.3. Factors which may influence the transition from primary to high school

As the above discussions have revealed, many learners experience the transition from primary to high school as difficult. In my view this is due to the fact that the context of the primary school is so different to the context of the high school. Learners experience certain aspects of schooling so different that they find it difficult to adjust to the new context. I present an in-depth discussion of a number of these aspects.

2.2.3.1 Learning Environments

The Literature reveals that the learning environment is of great importance in the transition to high school (Midgley, Eccles, & Feldlaufer, 1991; Speering & Rennie 1996). Nolen (2003) describes a learning environment as a place where people can get information which assists them to understand things better to reach meaningful solutions to problems. According to Perry et.al, (2006) learning environments focus upon academic achievement, curriculum and all components of learning within the school environment including the changes in pedagogical approaches. Midgley et.al (1991) reported that learners experienced significant changes in the classroom environment as a result of the transition and that these changes were likely to result in less positive attitudes towards academic activities. For the purpose of this study, the learning environment that I will focus on is the classroom. If learners are to learn meaningfully and effectively in the post transition period their classrooms must be conducive to learning (Pointon, 2000).

A learning environment that is conducive depends on the preparation of the teacher for every lesson (Komle, 2009). One of the many reasons why the primary learning environment appears to be different from that of high school is the relationship that primary school teachers have with their learners. Ferguson and Fraser (1998) describe a good teacher-learner relationship as one that is based upon teacher tolerance and understanding, qualities they

perceive as relatively deficient in post-transition science teachers. This lack of good teacher-learner relationship has a negative impact to learners' experiences of high school learning environments.

According to Hoy and Tarter (1997) one indication of a healthy school climate is a serious and orderly learning environment that is conducive to academic excellence. Hoy, Tarter and Bliss (1990) found that a learning environment with a strong academic emphasis promotes learner achievement. Both primary school and high school environment could be conducive to academic excellence but still be different.

This study will use classroom environment as a construct to establish learners' experiences with regard to learning of Science in Grade Eight. Nolen (2003) indicated that:

"classroom environment can have a significant impact on learners' learning and satisfaction in science and that learners in science classrooms where teachers were perceived to endorse independent scientific thinking and to desire deep understanding of science concepts had higher achievement and greater satisfaction with their science learning" (p.2)

There are also differences in the seating arrangement in classes between primary schools and high schools. Pointon (2000) states that *"in the primary school learners usually spend a lot of time at a table with two or three other students"* (p.380). On the other hand, high school offers the possibility not only of experiencing the range of seating patterns but also of independence and a chance to sit alone. The equipment used in high school is also very different to what learners in transition expect them to be. Braund and Driver (2005) showed that primary school learners expected to use more sophisticated equipment and dangerous chemicals in secondary school science, confirming the findings of other studies (Jarman, 1990; Griffiths & Jones, 1994). Pointon (2000) is also of the view that *"most secondary schools do not place as much emphasis on displays as do most primary schools"*. Even if there are displays at high school classes they are not relevant to learning and therefore do not help learners learn (Pointon, 2000).

2.2.3.2 Assessment

Assessment is an integral part of teaching and learning in both primary and high school contexts. Assessment is defined in the Department of Education's Assessment Guidelines for

Natural Sciences (DoE, RNCS, 2006) as "*the process of making decisions about a learner's performance*" (p.20). Mitchell (1989) defines assessment as the process of getting hold of evidence by one or a number of means and making judgements of the evidence in order to make inferences about an individual's competence. Wellington (2000) concurs that experienced teachers constantly use a number of means to assess learners in classrooms through oral questioning, listening to them talk or discussing in their groups, observing them during practical work as well as reading their written work. According to Suskie (2004) assessment is an on-going process of establishing clear, measurable expected outcomes of learning, while ensuring that learners have sufficient opportunities to achieve those outcomes.

Assessment as defined in the Revised National Curriculum Statement for Grades R-9 (DoE, RNCS, 2002) is a continuous, planned process of gathering information about the performance of learners measured against the Assessment Standards of the Learning Outcomes. The RNCS policy document clearly states that assessment should follow certain criteria and uses a variety of strategies in order for teachers to give feedback to learners and report to parents. Race (1998) suggests that feedback should be used to enhance learning. I am of the same view as well that assessment without timeous feedback does not achieve any good in terms of learning and enhancing learner performance. Learners should be given feedback from projects, tests, and assignments etc. as soon as possible if assessment is aimed at improving learner performance. Hughes and Wade (1996) point out the two main reasons to assess are: the need for teachers to gain information on the progress of individual learner so that appropriate activities may be organised in the classroom (formative) and the need to provide the parent with record of progress (summative).

Considerable academic differences exist between the primary school and high school environment with regard to assessment. Firstly, the high school environment places emphasis on evaluation of learners (Anderson, Jacobs, Schramm & Splittgerber, 2000; Benner & Graham, 2009; Wigfield et al., 1991). Secondly, different assessment strategies for the assessment of science learning are used in primary and secondary science courses. While a variety of strategies are used for assessment in both contexts, for example science projects, investigations, concept maps and questions and answers (So, 2004), Boaler, William and Zevenbergen (2000) assert that pencil and paper testing, while being the main method of assessment in science classes, is more prevalent in high schools. The DoE, RNCS (2002) does not advocate the use of one particular form of assessment above the other forms of

assessment, but rather states that we get a more accurate picture of a learner's development and progress if we assess the learning process on an on-going, continuous basis, which uses strategies that cater for different needs of a learner.

In a study by Attard (2010) on students' experiences of Mathematics during the transition from primary to high school, students found that as they progressed through the year, they became less concerned with the work load, and more concerned with the amount of assessments they were required to complete. This finding is consistent with literature (Peloage & Gaigher, 2009) that confirms that the assessment practices in high school are quite different to those in primary school. For example, assessment in high school is more competitive and norm-referenced, resulting in lower engagement (Martin, 2006).

A study of primary and high school teachers' conceptions of assessment by Brown and Geo (2014) revealed that the two groups of teachers had different perceptions of assessment: primary teachers associated assessment more with informal, interactive (assessment for learning) practices while high school teachers associated assessment more with formal, test-like (assessment of learning) practices. I intend to find out if this is also the case in this study. There is evidence that high school teacher's use stricter and more formal ways than primary school teachers to assess and evaluate learners' competence, leading to a drop in marks for many adolescents as they make the transition (Eccles, et al., 1993). Drawing from the above studies it can be argued that at primary schools assessment strategies used are more formative and continuous.

2.2.3.3 Teaching and learning strategies

Teachers have a vital role in the education of their learners. Their teaching styles may have a positive or negative impact on the way learners think about, learn and enjoy Science at school (Speering & Rennie, 1996). The results of the study by Speering and Rennie (1996) on learners' perceptions revealed that some teachers involved the learners in practical activities in most lessons, but most preferred a more transmission style approach. Research reveals that learners moving from primary school expected teachers to use more advanced teaching strategies (doing experiments, dissections, investigations and projects) and that Science would be more exciting, but to their surprise they just copied notes and watched demonstrations and listened to transmission of information (Baird et al., 1991). The nature of Science portrayed in our curriculum discourages teacher-centred approaches to teaching

(DoE, RNCS, 2002). In South Africa, teacher-centred approaches characterised by rote learning is still evident in some schools (Gaigher, Rogan & Braun, 2007) and appears to be more prevalent in high schools than in primary schools.

Inquiry- based learning

Inquiry-based learning is discussed in this literature as an important approach in science teaching and learning, which is also promoted by the DoE, RNCS (2002). Harlen (2009) defines inquiry as an activity that involves learners in making observations, posing questions, examining books and other sources for information to see what is already known, planning investigations, reviewing what is already known in the light of experimental evidence, using tools to gather, analyse and interpret data, proposing answers, explanations and predictions and communicating the results. This definition is in line with RNCS's view of inquiry-based learning since the RNCS documentation for Natural Sciences in South Africa has identified methods of inquiry such as formulating hypotheses, and designing and carrying out experiments to test the hypotheses. The RNCS promotes inquiry- based learning using methods that promote reproducibility, attempts at objectivity, and a systematic approach to scientific inquiry (DoE, RNCS, 2002). Learning (2004) describes inquiry-based learning as:

"*A process where students are involved in their learning, formulate questions, investigate widely and then build new understandings, meanings and knowledge. That knowledge is new to the students and may be used to answer a question, to develop a solution or to support a position or point of view. The knowledge is usually presented to others and may result in some sort of action"* (p.1).

The RNCS advocates a systematic approach to scientific inquiry. A systematic approach to the development of these skills is essential to prepare learners for problem solving and lifelong learning. According to Learning (2004):

"a systematic approach to inquiry-based learning is the one that uses the same process skills as learners proceed from primary grades through senior high school which will enable learners to become familiar with the inquiry process, understand a framework that supports searching for and using information, internalise a variety of inquiry skills and strategies for independent and group use, adapt procedures to various inquiry situations" (p.9).

A systematic approach ensures that learners have the opportunity to engage in inquiry, to learn an overall process and to understand that this general inquiry process can be transferred to other inquiry situations (Kühne, 1995). Therefore it is important for this study to include inquiry-based learning so as to examine if this approach is used in both contexts -primary and high school or only in high school or only in primary schools. The (DoE, RNCS 2002) promotes and supports an activity-based, learner-centred approach to teaching, thus making inquiry- based learning a corner stone in science education. Kühne (1995) suggests that using inquiry-based learning with learners can help them become more creative, more positive and more independent. If learners become acquainted with this approach in primary school, it will not be a new experience for them when the inquiry-based approach is implemented in Grade Eight. However, if this approach is not implemented in primary school, learners may find it very difficult to adjust to this approach to learning science.

Cooperative learning

The term cooperative learning is defined by Felder and Brent (2000) as "*students working in teams or projects under conditions in which certain criteria are satisfied, including that the team members be held individually accountable for the complete content of the assignment or project*" (p.1). Cooperative learning is often associated with a constructivist learning environment which emphasises the importance of meaningful, authentic activities that help the learner to construct understandings and develop skills relevant to problem- solving- all skills that are more easily developed in an environment where learners work together. Johnson and Johnson (2009) define cooperative learning as: *"the instructional use of small groups so that learners work together to maximize their own and each other's learning*" (p.2). Ormond (2008) asserts that in cooperative learning "*learners work in small groups in order to realise a common goal"* (p.437). In a cooperative learning situation, interaction is characterized by positive goal interdependence with individual accountability (Roger & Johnson, 1992). Gawe (2004) further states that *"in cooperative learning, learners construct their own knowledge through social negotiations"* (p.211). Other studies reveal that learners learn better from each other than they do from the teacher (Slavin , 1980).

I am of the view that as learners' transit to high school working together in their groups could give them opportunities to learn from each other and also to teach each other thus easing some of the academic challenges encountered during transition. According to Wolfinger and Stockard (1997) the theory of cooperative learning is based on the premise that when small

groups of learners of mixed backgrounds and capabilities work together to achieve a goal or complete the task there are greater opportunities to increase their friendship and respect for one another.

Cooperative learning approaches are not just a grouping of learners to learn (Pillay, 2008) and are certainly not a synonym for learners working in groups (Felder & Brent, 2000). For group work to qualify as a cooperative learning approach it must realise a common goal guided by positive interdependence, individual accountability, face-to-face promotive interaction, and appropriate use of collaborative skills as well as group processing (Roger & Johnson, 1992). Felder and Brent (2000) are of the view that the benefits of cooperative learning approaches are not automatic but teachers need to know how to plan it successfully. It is important for teachers to implement this approach to enable learners to help each other and benefit from working cooperatively in groups.

Pillay's (2008) study revealed that cooperative learning was not practiced in intermediate phase classrooms of her study as teachers revealed that they were not exposed to this strategy of teaching and learning in their training. I believe that due to teachers' insufficient knowledge of this teaching approach it is not entirely functional in schools. In most primary schools learners sit in groups but not necessarily for cooperative learning purposes. I believe that if cooperative learning approaches could be fully utilized in schools it would benefit learners the most, in contrast to individual learning approaches, which is witnessed in many classrooms. Felder and Brent (2000) state that cooperative learning approaches are useful as they help learners preserve knowledge and improve grades and the level of thinking skills become higher. They further state that cooperative learning improves attitudes towards the subject and motivation to learn. The above research suggests that the nature of co-operative learning differs in primary and high schools and this study will attempt to find out if this is indeed the case.

Practical work

In many countries, including South Africa, one of the features of Science Education that sets it apart from most other school subjects is that it involves practical activities in which the learners observe and manipulate real objects and materials (Abrahams & Millar, 2008).The R DoE, RNCS, (2002) states that "*to be accepted as science, certain methods of inquiry are generally used"* (p.12). Woolnough (1991) defines practical work as the performance of

experiments or practical exercises with science apparatus, usually in a laboratory setting. Practical work as defined by Lunetta, Hofstein and Clough, (2007) refers to learning experiences in which learners interact with materials or with secondary sources of data to observe and understand the natural world.

In South Africa the RNCS policy document for Natural Sciences, (DoE, RNCS, 2002) places a strong emphasis on '*doing science'* as opposed to traditional transmission learning about the facts and theories of Science. This is evident in Learning Outcome One of the senior phase document as well as assessment standards for this learning outcome. The Curriculum and Assessment Policy Statement (CAPS) DoE (2011) also supports this idea.

South African as well as international studies indicated that the opportunity for learners to do investigative work on their own is still limited and practical work is confined to using "cookbook" methods (Pillay, 2004). Teacher demonstrations are a norm instead of learners' individual hands-on activities (Dekker & Maboyi, 2002). However the study conducted by Collusi (1997) found that little practical work of any kind was carried out due to a lengthy high school syllabus. A study by Hatting, Aldous and Rogan (2007) investigated some factors influencing the quality of practical work in science classrooms in South African schools. The focus was on the implementation of practical work within the new science curriculum. This study revealed that practical work is conducted in most science classes even though little is known about factors that may facilitate its implementation. According to Hatting et.al (2007), the most frequently used practice is level 1, which according to Rogan and Grayson's (2003) theory of implementation is the level in which learners mainly observe the teacher who performs the demonstration. International studies also show that practical work is still limited in many science classrooms. In many cases, hands-on work is only present as either teacher demonstrations or as cookbook-style experiments for learners (Hodson, & Bencze, 1998). When one looks at the research on practical work it is clear that practical work at schools is still dominated by teacher demonstrations and cookbook procedures that do not allow learners a chance to interact with materials and design the investigations as it is envisaged by RNCS. This is proven to be the case both internationally and nationally.

The above findings are disturbing in the light of the fact that most learners enjoy doing practical work in science classes. According to Abraham and Miller (2008) it is evident that learners find practical work fairly useful and enjoyable in comparison to other science

teaching and learning activities. Cerini, Murray, and Reiss (2003) found that doing experiments in class is one of the three methods of teaching and learning science learners found most enjoyable. Hodson (1990) asserts that hands-on practical work such as experiments can be regarded as an enjoyable and effective form of learning.

The study conducted by Abrahams and Reiss (2010) suggested that primary school teachers see practical work as both a 'minds-on' and 'hands-on' activity. This study revealed that primary school teachers used rather short practical tasks embedded in a lesson ensuring that all learners are able to see the desired phenomenon in the time available. They further state that primary school teachers devoted some of the whole class time ensuring that they introduce learners to, and discuss new scientific concepts.

"*What emerged from our study is how well conceived; clear and productive practical science was in the primary schools we visited"* (Abrahams & Reiss, 2010 p.26). I support this practice of primary school teachers as it enhances the value of practical work; it ensures that learners understand practical work in both the domain of objects and observables as well as the domain of ideas (Millar & Abrahams, 2009).

According to Hodson as cited in Abraham and Reiss (2010) the opposite is true for practical work in secondary schools "*as practised in many [secondary] schools, it is ill-conceived, confused and unproductive. For many children, what goes on in the laboratory contributes little to their learning of science"* (p.176). The difference noted here between primary and secondary is that secondary teachers are more concerned with procedures of doing the experiment and observing the phenomenon without ensuring that the concepts are mastered.

One of the ways of finding out how Science is taught is to compare how process skills are developed. This is especially useful when identifying how practical work is conducted. I intend using process skills as a measure to compare the types of practical work conducted in Grade Seven and Eight respectively. It is for this purpose that process skills will be discussed in more detail in the next section.

2.2.3.4 Process Skills

The term process skills refers to learners' cognitive activity of creating meaning and structure from new information and experiences (DoE, RNCS, 2002). According to the Exploratorium Institute for Inquiry (2006) science process skills are the tools for gathering information,

generating and testing new ideas, for building new knowledge, and for learning scientific concepts and constructing scientific explanations of the world. Process skills are especially important in inquiry-based learning because they are the tools that students use to carry out scientific investigations. From a teaching point of view, process skills can be seen as the building blocks from which suitable science tasks are constructed. From the learning point of view, process skills are an important and necessary means by which the learner engages with the world and gains intellectual control of it through the formation of concepts (DoE, RNCS, 2002). The Exploratorium Institute for Inquiry (2006) asserts this when they say science process skills are the tools that learners use to investigate the world around them and construct science concepts; they further state that it's essential for teachers to have a good understanding of these skills. However they also mention that identifying and defining process skills is not always a simple task.

Rezba, Sprague, Fiel, and Funk (2003) assert that science process skills are the basic skills people use when they do Science. Earlier studies suggested that these basic skills can be taught and when learned can be readily transferred to new situations (Thiel & George, 1976; Tomera, 1974). Padilla (1990) defines these skills as a set of broadly transferable abilities, appropriate to many science disciplines and reflective of behaviour of scientists. Millar and Driver (1987) argue that science process skills like hypothesising and predicting cannot be learned and transferred but are intuitive. However I do not agree with Millar and Drivers' statement. Science Process skills can be taught and acquired but not in isolation; rather they are developed by engaging in many, if not all science activities (Murphy, 2006).

The scientific method, scientific thinking and critical thinking have been terms used at various times to describe these science skills. Today, the term "science process skills" is commonly used. It was popularised by the curriculum project, SAPA – Science, A process Approach which grouped process skills into two types - basic and integrated (Padilla, 1990). Basic science process skills provide a foundation for learning the more complex integrated science process skills (Padilla, 1990). According to Harlen and Qualter (2004) and Herman (2009) they also believe that integrated science process skills can be taught to primary school learners. I will use a number of process skills to compare the teaching of Science in Grade Seven and Eight.

Basic Process Skills

Basic science process skills apply specifically to foundational cognitive functioning in especially the elementary grades (Rambunda & Fraser, 2004). It can be said that these basic science skills form the foundation for learning and development of more complex integrated science skills (Padilla, 1990). According to Brotherton and Preece (1995) these skills form the backbone of the more advanced problem-solving skills and capacities. They further state that basic science skills represent the foundation of scientific reasoning that learners are required to master before acquiring and mastering the advanced integrated science process skills. Process skills are almost never practised separately but they intertwine and overlap as learners use them (Exploratorium Institute for Inquiry, 2006). The above statement implies that basic science process skills are interdependent and learners may display and apply more than one skill in a single activity (Funk, Fiel, Okey, Jaus & Sprague, 1979). According to Rezba et.al, (2003) science process skills form the foundation for scientific methods.

I discuss a number of basic process skills briefly to obtain some understanding of how researchers in the field define each of the skills.

Observing

The most basic science process skill is observation. Observation can be done by using our senses–seeing, hearing, touching, tasting or smelling, to gather information about any object or phenomenon. Murphy (2006) agrees that observation is the fundamental skill in which children select information using all five senses. I am of the view that the information learners' gain through this skill may lead to learner curiosity which can lead to the development of other science process skills. This is supported by Rezba (1999) saying that the ability to make good observations is also essential to the development of the other science process skills such as communicating, classifying, measuring, inferring, and predicting.

Comparing

This process skill goes hand in hand with observation; while observing objects or organisms learners are required to compare these organisms or objects. The RNCS, (DoE, 2002) states that when comparing learners are expected to note similarities and differences between objects, events or organisms with or without the prompting of the teacher and describe their

comparisons in detail using words or numbers. For example, they may observe parts of a flower and compare the male and female parts.

Communicating science information

According to Rezba (1999) observation skills also go hand in hand with communication skills since learners have to communicate their observations verbally, in writing, or by drawing pictures. The (DoE, RNCS,2002) states "*communication may involve the learner in noting details about objects, organisms and events with and without prompting by the teacher, noting similarities and differences, describing them in general terms, or describing them numerically"* (p.13). Communication can take many forms including using words, actions, posters, diagrams, pie-charts or graphic symbols to describe an action or event (Monhardt & Monhardt, 2006; Rezba et.al, 2003). This process skill helps learners to reflect on their own learning and to build confidence as a person (DoE, RNCS, 2002) states "*competence in communicating involves knowing when it is important to make extra effort to communicate one's ideas or results, and choosing an appropriate means to communicate with the specified audience*" (p. 14).

Sorting and Classifying

The process of classifying requires learners to recognise, sort and arrange objects according to their similarities and differences (Murphy, 2006). Classification is the separation and grouping of objects or phenomena into groups according to criteria or characteristics (Padilla, 1990). The (DoE, RNCS, 2002) states that classifying and sorting not only refer to sorting and arranging but it may also involve the learner using a given rule to sort items into a table, mind map, list or other system, deciding on own rules for classifying, or choosing a suitable system such as a table, dichotomous key, or mind map. Martin, Sexton, Wagner and Gerlovich, (1994) assert that classifying and sorting need people to organise their observations in ways that convey special meaning. Learners classify these in order to comprehend them. Classification takes place through observing similarities, differences and interrelationships.

The Exploratorium Institute for Inquiry (2006) emphasises that process skills cannot be practised separately; they further mention that some of these skills are sub-skills of other skills, for instance when a learner is to classify objects she must first observe and record her observations in one or another form of communication. Therefore it is important for learners

to develop these science basic skills while they are in primary school as these will not only help learners to do Science but they will also be beneficial to their schooling life if these skills are fully developed. Learners who have strong basic science process skill are likely to perform well in acquiring complicated integrated science process skills.

Measuring

Measuring is a way of quantifying observations and in this process learners should learn to make estimations. Learners should know **what** to measure, **how** to measure and have a sense of the degree of accuracy that is required. A variety of things could be measured including (but not limited to) length, volume, temperature, weight or mass, numbers (counting) (CAPS, 2011).Measuring may involve the learner in using instruments accurately, reading scales and using intermediate points between divisions on scales, choosing appropriate instruments or appropriate scales on instruments, knowing when it is appropriate to measure, and choosing to do so without prompting by the teacher (DoE, RNCS, 2002). Measuring and using numbers is a skill of conducting observation through a quantitative approach by using standard unit equipment such as a ruler, weighing scales, pipette or volume flask. Measuring enables observation to be conducted accurately. The ability to use numbers is important to master measuring skills. Measuring tells us how much or how many about a certain substance but that is not sufficient if the unit of measurement is not included. While developing the skill of measuring in learners it is equally important to make them understand that measuring units give a substance to numbers, it tells us how much of what (Exploratorium Institute for Inquiry, 2006).

Predicting

Harlen (1999) argues that opportunities to make predictions can be created both in relation to patterns found in observations and in relation to hypotheses that are put forward to explain observations. The Exploratorium Institute for Inquiry (2006) defines predicting as forecasting the outcome of a specific future event based on a pattern of evidence or a hypothesis (an explanation). They warn that a prediction is *not* a wild guess but making predictions is making educated guesses about the outcomes of the future events (Rezba, et al. 1995). I agree that process skills are interdependent, therefore for learners to develop good predicting skills they must have developed good observation skills since predicting is not just wild guesses; it is formed from experiences and observations. Rezba et al (1995) assert that prediction is

based on both observation and inferences made about observed events. Like inferences, predictions are based on both what we observe and also our past experiences- the mental models we have built up from those experiences. According to the (DoE, RNCS, 2002):

"*predicting involves the learner in using knowledge to decide what will happen if something is changed in a situation; this skill includes predicting from patterns in information, or interpreting a model of a system to predict how a change in one variable will cause a change in another variable*" (p.14).

Recording information

Recording results include recording observations or information as drawings, descriptions, in simple table format, as simple graphs, etc. The skill of recording is transferable across a range of different scientific activities (DoE, CAPS, 2011). This process skill may involve the learner in recording in a format which is prescribed (sentences, lists, tables, labelled diagrams), or selecting suitable formats in which to record the information when asked to do so without *being prompted by the teacher* (DoE, RNCS, 2002, p.13).

Integrated process skills

Integrated science process skills are regarded as more advanced than basic process skills (Collette & Chiappetta, 1986) cited in Rambunda & Fraser, 2004. These are skills that are used in problem-solving (Rambunda & Fraser, 2004). According to Rambunda and Fraser, (2004) the term *integrated* implies that learners are called upon to combine basic process skills for greater expertise and flexibility to design the tools they apply when they study or investigate phenomena. This process can lead to the realisation and achievement of integrated science process skills as observable and demonstrable outcomes. Therefore it can be argued that basic science process skills form the basis on which learners can learn and develop integrated science process skills. According to Padilla (1990) integrated process skills include skills such as: controlling variables, defining operationally, formulating hypotheses, interpreting data, experimenting and formulating models. Padilla, Okey and Garrard (1984) believe that the more complex process skills cannot be learned during short periods of instruction but need to be practiced over a period of time.

Controlling variables

According to Padilla, (1990) controlling variables *"refers to being able to identify variables that can affect an experimental outcome, keeping most constant while manipulating only the independent* (p2). Example: Planting and observing the growth of bean seeds. All seeds must be exposed to same amount of light and water; then the height of the plant is measured every second day.

Formulating hypotheses

Formulating hypothesis means stating the possible results of an experiment. Example: The greater the amount of organic matter added to the soil, the greater the bean growth (Padilla, 1990). According to the Exploratorium Institute for Inquiry (2006) hypothesising means giving a tentative explanation, based on experience of a phenomenon, event, or the nature of an object. A hypothesis is testable and it is not the same thing as a prediction, which is the expected outcome of a specific event (Exploratorium Institute for Inquiry, 2006). However, a hypothesis can be used to explain specific events. Murphy (2006) asserts this when she defines a hypothesis as a reasonable 'guess' to explain a particular event or observation and that it is not a statement of a fact. Harlen (1999) defines a hypothesis as an attempt to explain some observation, happening or relationship. She cautions against the idea that a hypothesis has to be 'right'. Hypothesising may involve the learner in naming possible factors which could have an effect on a situation, giving reasons why something has happened, stating a reason or cause for something, or using prior knowledge as well as information given in the task (DoE, RNCS, 2002).

Interpreting data

According to Padilla (1990), interpreting data refers to organising data and drawing conclusions from it. For example: recording data on the absorption of the sun's radiation by different surfaces i.e. white, black and shiny, and using the data to conclude which surfaces are good absorbers and good reflectors. Exploratorium Institute for Inquiry (2006) describes the skill of interpreting data as a means of considering evidence, evaluating, and drawing a conclusion by assessing the data and finding the pattern or other meaning in a collection of data. The (DoE, RNCS, 2002) defines interpreting data as a skill that involves the learner in a number of ways of creating meaning and structure. One way is to know how to get information from books and learning from printed pages, as well as being able to change the

information from one form to the other, such as using data in tables to construct graphs or data in graphs to short summaries.

Experimenting

Experimenting means being able to conduct a scientific test. This includes asking relevant questions, formulating hypothesis, identifying and controlling the variables and being able to use those variables to design "fair" tests, conduct the experiment and interpret the results. For example: Conducting an experiment to find out the effect of light and water on the growth of a bean plant (Padilla, 1990). Conducting an experiment is a complex process skill that requires the learners to persevere until the phenomena happen using observations, collecting and analysing data and drawing conclusions in order to solve a problem situation (Martin et al., 1994). (DoE, RNCS, 2002) refers to experimentation as the skill of planning science investigations which is a combination of many of the skills. This skill involves the learner in formulating investigable questions, deciding which variables are necessary in the problem or question, planning which variables will be constant (control) and which ones will change (DoE, RNCS, 2002).

Formulating models

Formulating models refers to creating a mental or physical model of a process or event. For example making a model of the earth to show how the earth rotates on its own axis (Padilla 1990).

Raising questions

Raising questions about a situation involves thinking of questions which could be asked about a situation, recognising a question which can be answered by scientific investigation (as opposed to a question which science cannot answer), or rewording the question to make it scientifically testable (DoE, RNCS, 2002). Learners should be encouraged to raise questions even if the questions are not investigable questions. Encouraging learners to ask general questions should be the starting point towards developing the skill of asking questions that are investigable. One of the characteristics of science is that of inquiry-based learning. Therefore, if we are to promote inquiry-based learning it is important to afford learners a chance to ask questions and moreover enable them to ask investigable questions. Within an inquiry-based framework, questions are tools for planning, teaching, thinking, and learning (Martin, Sexton, & Gerlovich, 2005).

2.3 CONCEPTUAL FRAMEWORK

A number of concepts are used to frame the study. These concepts form a framework which serves as a lens through which the research is conducted. The five constructs that I used to guide my methodology and analyse the data are teaching and learning environment, teaching strategies, assessment, process skills and managing transition. A number of constructs have sub-constructs. These constructs and sub-constructs are used to analyse how science is taught in Grade Seven and Eight respectively; how learners experience the transition from Grade Seven to Grade Eight and how teachers mange this transition. Figure 2.1.presents my conceptual framework

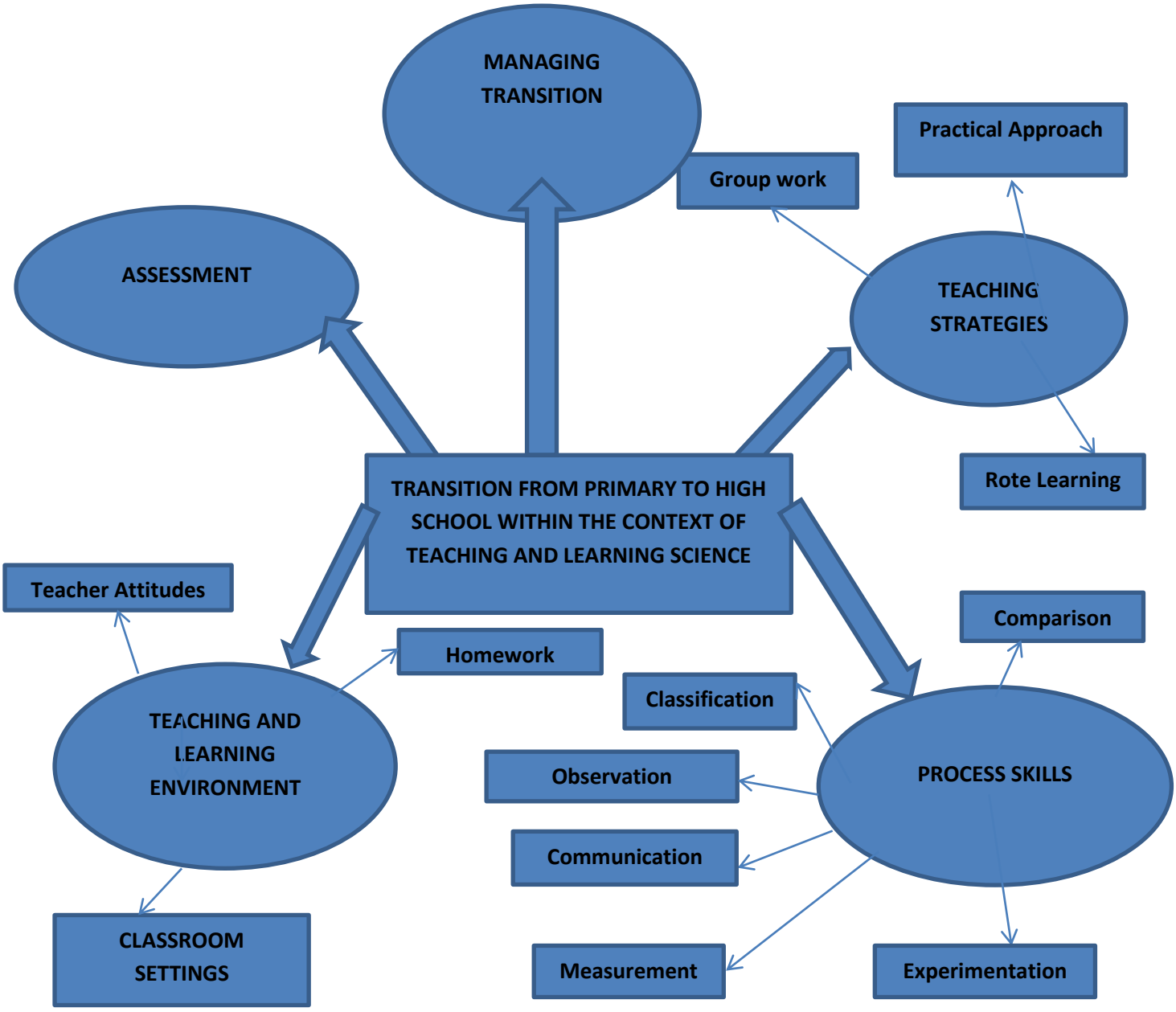

Figure 2.1 The Constructs and sub-constructs utilised to explore the transition from Grade Seven to Grade Eight

Many factors may impact on the transition from primary to high school and these factors may differ in different contexts. I have selected a number of constructs that I believe are pertinent to my study. I will briefly describe each of the constructs and explain how they will be used to frame my study.

2.3.1. Teaching and learning environment

The teaching and learning environment was used as a lens to establish learners' experiences with regard to learning Science in Grade Eight, compared to their learning of Science in Grade Seven. Classroom environment is one of the important aspects of transition. Therefore the classroom environment as one aspect of the learning environment was selected as a unit of analysis. This is the place where teaching and learning occurs. Teaching and learning environment is determined by how teaching and learning are taking place. I used the sub constructs classroom setting to compare Grade Seven and Grade Eight classrooms; teachers' attitudes were used to compare Grade Seven and Grade Eight teachers in terms of their attitudes towards their learners and their interaction with learners within the context of learning and teaching Science. I am of the opinion that teacher attitudes are very important during transition as they can boost confidence of learners thus produce positive reinforcement in teaching and learning or break confidence in learners, resulting in negative reinforcement. Homework as the sub-construct helped me to compare the primary school learning environments with high school environment in terms of the frequency of homework given as well as the volume of homework given. The design of the research instrument was informed by these components of the teaching and learning environment.

2.3.2. Teaching Strategies

The construct teaching strategies is included in an attempt to understand to what extent teaching strategies differ in primary and high school. Although the (DoE, RNCS, 2002) advocates a learner-centred approach across all phases, teacher-centred approaches are still the norm in many schools (Gaigher, Rogan & Braun, 2006). This construct was used to determine if different approaches are used in the two contexts (Primary and High School).

The sub-constructs which framed the analysis of the data were rote learning, practical approach and group work.

The teaching strategies that were focussed on are: teacher-centred approach which is aligned with rote learning and demonstrations. These sub-constructs allowed me to be able to find out if the teaching strategies used by primary school teacher are different to those used by high school teachers. The sub-constructs practical approach and group work which is aligned with learner-centred approaches were used to compare the teaching strategies used in Grade Seven and Grade Eight. In this study, group work is understood and used according to the definition of Johnson and Johnson (2009).

Previous research has shown that teaching strategies change as learners move from primary to high schools (Hargreaves & Galton, 2002; Pointon, 2000). The findings of this study will either support or contradict such research. As with learning environment, this construct informed the research instrument design to elicit relevant data.

2.3.3. Assessment

Assessment as the cornerstone of teaching and learning was also selected as one of the constructs used to frame this study. Teachers use a variety of assessment strategies to assess learners. According to Black and William (1998) assessment has always been a crucial issue as it is used to measure the learning process in order to give feedback to individuals for future success. In South Africa assessment informs teachers about how learning might be improved in order to enhance a learner's individual growth and development (Van Laren & James, 2008). Apart from its formative nature it also informs the learner about his or her performance and also provides the parents with the record of their children's performance. The data generated in this study was informed by this construct as well since it informed the formulation of the research instruments design. I used assessment as a lens to compare if assessment activities are taking place in these grades. I wanted to ascertain if the number of assessment activities prescribed by the curriculum is actually undertaken. Through this construct I was able to see if different forms of assessment are used in these grades as envisaged by the (DoE, RNCS, 2002).

2.3.4. Process skills

Process skills are cognitive skills, some of which are dependent on practical work and others not. Learners need to learn and develop these skills which will not only help them in classroom situations but also in their daily lives. "*When we teach learners to use these skills in Science, we are also teaching them skills that they will use in the future in every area of their lives"* (Rezba, 1999). The (DoE, RNCS, 2002) advocates a learner-centred, activity-based approach to teaching and learning. The development of process skills are dependent on learner-centred approaches as these skills cannot be taught by transmission and need to be practised. Science process skills may be aligned with inquiry-based learning (Huber & Moore, 2001) and both of these concepts are highlighted as important in the teaching and learning of Natural Sciences (DoE, RNCS, 2002). The construct process skills as influential in informing the design of the research instruments used to obtain data for this study. I selected a number of the process skills discussed in the literature. The science process skills used as the lens to frame and analyse the data are measurement, observation, comparison, communication, classification and experimentation. I chose to use these science process skills to frame the study because they are the most basic process skills promoted by the (DoE, RNCS, 2002). They are the stepping stones to acquiring more complicated integrated skills.

2.3.5. Managing transition

This construct is included in my conceptual framework as it guided my research with regard to the way grade eight teachers interact with learners and manage the challenges learners are confronted with.

2.4 CONCLUSION

This chapter discussed the notion of transition as a fundamental aspect influencing the lives of children. Various constructs which inform the notion of transition were discussed as they emerged from the literature. Constructs pertinent to transition were incorporated into the conceptual framework and presented in this chapter. This study seeks to find the differences regarding these aspects between primary schools and high schools. The design and methodology that informed the research is discussed in Chapter Three.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

Methodology is a crucial aspect of research since it provides the work plan for the researcher. It helps in determining if the methods used are efficient and will yield accurate results. It also helps the researcher not only to know the research methods but also to be able to determine which methods are suitable for answering the research problem. (Rajasekar, Philominathan & Chinnathambi, 2013).

This chapter describes the paradigm in which my research is situated as well as the approach followed. I also discuss the research design as well as the methods and instruments I used to collect the data. The setting in which the research is conducted is described and the ethical procedures explained. Issues of validity and credibility are also discussed as crucial aspects of methodology.

3.2 RESEARCH PARADIGM

This study is located within the pragmatic paradigm. The pragmatic paradigm uses the method which is best suited to the research problem; it is not involved in the debate as to which method is the best (Morgan, 2007). According to Johnson and Onwuegbuzie (2004) pragmatism adopts a varied methodological, approach to research, drawing on positivism and interpretive epistemologies. This paradigm is based on the criteria of appropriateness for purpose and regards reality as both objective and socially constructed. The pragmatic paradigm draws on, and integrates both numeric and narrative approaches. Quantitative, as well as qualitative data is regarded as necessary and relevant to meet the needs of the research rather than the preferences of the researcher and serves to answer the research questions fully (Johnson, Onwuegbuzie & Turner, 2007). Feilzer (2010) is of the view that *"Pragmatism argues that there may be both singular and multiple versions of the truth and reality, sometimes subjective and sometimes objective, sometimes scientific and sometimes humanistic"* (p14) while Creswell (2013) asserts that pragmatists do not see the world as an absolute unit. My study is located in the pragmatic paradigm because this paradigm allowed

me the freedom to use any method, technique and procedures related to quantitative or qualitative methods to collect data (Morgan, 2007). As I made use of both quantitative and qualitative data in my study, I believe the pragmatic paradigm is the most appropriate.

3.3. RESEARCH APPROACH

The approach deemed suitable for this study is the mixed methods approach. Creswell (2013) defines mixed methods research as an approach to inquiry that uses qualitative and quantitative forms of data. He further states that the mixed methods approach is more than merely collecting and analysing both kinds of data but it involves utilising both approaches in sequence so that overall strength of the study is more powerful than either the qualitative or quantitative research.

The mixed method approach was chosen on the basis that in this study data collected were both qualitative and quantitative in nature. Quantitatively I developed and administered questionnaires for both teachers and learners. The mixed methods approach is associated with the pragmatic paradigm and applies strategies that involve collecting data in a simultaneous or sequential manner using methods that are drawn from both quantitative and qualitative traditions in a way that best addresses the research question/s (Creswell, 2013). That is exactly what I did. I first collected data through the use of a closed questionnaire followed by a focus group interview. I chose to employ the mixed methods approach for gathering data because it broadens the understanding by incorporating both qualitative and quantitative approaches (Creswell, 2013). The two approaches complement each other because both approaches provide data to answer the same research questions. The study seeks to obtain an in-depth understanding of learners' experiences of transition to high school within the context of learning Science, grade seven teachers' views of the skills grade seven learners have, as well as grade eight teachers' expectations regarding the science skills grade seven learners should bring to Grade Eight. The strategy used in this mixed method approach is a concurrent triangulation approach where the researcher collects both quantitative and qualitative data concurrently and compares the two databases to determine if there is a relationship, differences or some combination (Creswell, 2013).

3.4. RESEARCH STRATEGY

Mouton (2001) describes a research design as a plan or blueprint of how one intends to conduct the research. The research design used in the present study is a case study because case studies strive towards a holistic understanding of how participants relate and interact with each other in the specific situation and how they make meaning of a phenomenon under study (Nieuwenhuis, 2007). Huberman and Miles (2002) assert that the case study is the research design that centres on understanding the changes occurring within a single setting. Its key strength lies in the fact that it uses multiple sources and techniques for gathering data (Nieuwenhuis 2007). Yin (2014) points out that a case study is a study of case in a context and that it is important to set the case within its context. Therefore a case study seemed more appropriate for this study because I tried to elicit the learners' experiences in their own context and used a variety of data collection methods in an attempt to understand learners and teachers in terms of their own world (Mouton 2001).

According to Cohen, Manion & Morrison (2011) a case study researcher observes the characteristics of an individual unit, for example a learner, a group, a class, a school or a community. They further mention that the purpose for such observation is to probe deeply and analyse intensively the diverse occurrences that constitute the life cycle of the unit, with the view to establishing generalisations about the wider population to which that unit belongs. Both quantitative and qualitative data collection methods were used in order to gain a richer understanding of learners' experiences of transition to Grade Eight and teachers' expectations of grade seven learners when they transit to Grade Eight regarding the learning and teaching of Natural Science. The case study design was considered suitable for this study because a case study is not limited to single source of data but uses multiple sources of data which include both qualitative and quantitative data (Yin, 2011). Since a case study utilises a variety of methods of data collection it seemed suitable for this study to employ a mixed methods approach. A mixed methods approach is underpinned by pragmatic knowledge claims. A case study is not limited to either the quantitative or qualitative approach. The case study design employed by this study is a holistic multiple case study. In this study data was collected from different schools which form the multiple cases. However, the phenomenon under study, which is transition from Grade Seven to Grade Eight, forms the common thread which binds the multiple cases of teachers and learners into a holistic unit.

3.5 THE SETTING

Although this is a pragmatic study, the setting was similar to a qualitative research setting because research data was collected in natural settings where participants experience the issue or problem under study. Data are gathered by actually talking directly to people and seeing them behave and act within their context (Creswell, 2013).

This study was conducted at primary schools and high schools of KwaZulu-Natal which is the natural setting of the participants. The participants all came from Vulindlela wards (North and West) in the Umgungundlovu district. The schools were purposively selected as I could easily reach them, which helped in saving time. Choosing them also minimised the cost of transportation. Purposive sampling of the schools occurred as I had to consider the distribution of resources for each school. I ensured that the schools chosen for this study are similar in terms of resource distribution. This would in turn ensure that the contexts of the schools do not influence or affect the transition. All participants were selected from these wards. The purposive sampling used in this study is in line with what Cohen, et al (2011) indicate when they assert that purposive sampling is a feature of qualitative research, and the cases are handpicked to be included in the sample on the basis of their typicality or possession of the particular characteristics being sought. So these schools were handpicked and included in the study because they are in the same area and high schools are surrounded by at least three primary schools of which two are included in the study.

3.5.1. The sample

Samples from both primary and high schools were used. The primary school samples consisted of two teachers from Grade Seven from each sample school. I used pseudonyms to name teachers PST1- Mrs Jama and PST 2- Mr Maseko. I used learners' workbooks from both primary schools as mentioned above in the discussion of document analysis.

The high school sample consisted of two teachers and grade eight learners. HST1- Miss Thwala, was from high school A- Amanzamhlophe High School with 60 learners in the observed class and HST2- Miss Hadebe was from High school B- Zamelisizwe High School with 37 learners in the observed class.

Table 3.1: Table showing the samples of teachers

Teacher	Name of teacher	Type of school	Pseudonyms of schools	No of learner observed
HST 1	Miss Thwala	High school (A)	Amanzamhlophe	60
HST 2	Miss Hadebe	High school (B)	Zamelisizwe	37
PST 1	Miss Jama	Primary (A)	-	-
PST 2	Mr Maseko	Primary (B)	-	-

3.5.2 Description of schools

A description of the participating schools is important because it provides information about the context of the schools which could affect or influence the transition of learners from primary schools to high schools with regard to teaching and learning. This information is provided in Table 3.2

Table 3.2 Overview of the four schools which participated in the study

Aspects described	Primary School A	Primary School B	High School A	High School B
Rural/Urban/ Peri-urban	Rural	Rural	Rural	Rural
Physical Resources	Buildings in good condition Administration block and classes No science room or laboratory	Buildings in good condition Administration block and classes No science room or laboratory Attractive grounds and vegetable gardens	Buildings in good condition Administration block Photocopying room, Computer room, No science room or laboratory	Building in good condition Administration block and classes No science room or laboratory
Running water and electricity	Yes	Yes	Yes	Yes

Staff members	25 teachers including – Principal, Deputy principal and 3 HOD's 1 Grounds person	20 teachers including – Principal, Deputy Principal and 3 HOD's 1 Security and one grounds person	35 teachers including Principal, 2 Deputy principals and 5 HODs One security and one grounds person	20 teachers including- Principal, Deputy principal and four HOD's One security and One grounds person
Learner Enrolment	700	650	1200	600
LOLT	English FAL	English FAL	English FAL	English FAL

Table 3.2 shows that the physical conditions of the schools that participated in the study are not that different. So the transition could not be influenced or affected by the context of the schools.

3.6 INSTRUMENTS AND METHODS OF DATA COLLECTION

Collection of data is necessary to obtain information that will provide answers to important questions (Johnson & Christensen, 2004). According to Maree and Pietersen (2007) a number of different methods may be used to collect data from participants. Cohen et al. (2011) agree that there is no single prescription for which data collection instrument to use as a researcher uses a variety of techniques for gathering the information. Mouton (2001) asserts that the most common used methods of data collection by educational researchers are tests, questionnaires, interviews, focus-group interviews, observations as well as primary and secondary sources.

I used a number of methods in my study to obtain the necessary data to answer my research questions below:

(1) What science skills do learners acquire in Grade Seven?

(2) How do learners experience the transition from primary to high school with regard to science teaching and learning?

(3) What are grade eight teachers' perceptions of what learners know with regard to Science when they enter high school?

(4) How do grade eight teachers manage learners' transition from primary to high school in science classrooms?

Below is the table that provides an indication of the methods and instruments used in this study to collect data.

Table 3.3 An overview of data collection methods and instruments

Research Questions	1. What science skills do learners acquire in grade seven?	2. How do learners experience the transition from primary to high school with regard to science learning?	3. What are grade eight teachers' perceptions of what learners know with regard to the Science when they enter high school?	4. How do grade eight teachers manage learners' transition from primary to high school in science classrooms?
Data collection methods and instruments	The data for this research question was collected using the following methods and instruments: 1. Survey - Questionnaire for grade seven teachers 2. Documents Analysis – learners' workbooks and lesson plans	1. Survey - Questionnaire for learners 2. Focus group interviews with learners	1. Interviews - Semi - structured interviews schedule for grade eight teachers	1.Classroom Observations - observation schedule 2. Interviews Semi - structured interviews schedule for grade eight teachers

The methods and instruments used for each set of data collection are discussed below.

3.6.1 Survey

This study employed a small scale survey (Appendix L) as a method of data collection. Cohen et al. (2011) states that the kinds of surveys often used in education are to obtain test results, self-completion questionnaires and attitude scales to gather large-scale data from the participants. The instrument used in my survey was a questionnaire. According to Cohen et al. (2011) questionnaires range from structured, semi structured to unstructured. Questionnaires can contain structured, closed questions or open ended questions. The advantage of questionnaires is not only that they are easy to administer and compare, as they use the same set of questions for all the participants, but also because they are reliable (Denzin & Lincoln, 2000). A questionnaire with structured, close questions presents a range of responses from which the respondents choose (Maree & Pietersen, 2007). Highly structured, closed questions are useful in that they can generate frequencies of responses open for statistical analysis (Cohen et.al, 2011). They further state that questionnaires with closed questions are easy, quick to answer and respondents are able to answer sensitive questions more easily. Closed questions are quicker to code and analyse than word- based data, and often they are direct and to the point and more focused than open-ended questions (Cohen et.al, 2011; Maree & Pietersen, 2007). Moreover, Cohen et al., (2011) state that closed questions do not discriminate against respondents according to their articulation. There are advantages as well as disadvantages of using questionnaires with closed questions (Maree & Pietersen, 2007). Some of the disadvantage that they mention is that the questionnaire with closed questions restricts the participants to answer and express their ideas as they wish. Closed questions may suggest the answer to respondents causing them to answer even the questions that are misunderstood without seeking clarity (Maree & Pietersen, 2007).

In open-ended questionnaires, questions are asked and the space is provided for the respondent to write their comments whereas in closed-ended questionnaires a question is asked and the respondent has to choose the answer from provided options (Maree & Pietersen, 2007). The advantage of using questionnaires with open ended questions is that it allows the respondents to answer as much as they wish, providing details (Cohen et al., 2011). On the other hand, they may be too difficult for semi-literate people to answer (Maree & Pietersen, 2007) leading to irrelevant and redundant responses (Cohen et al., 2011). Maree and Pietersen (2007) and Cohen et al. (2011) further state that analysing open ended questions is more difficult compared to analysing closed ended questions.

In the present study I used a structured questionnaire for grade eight learners which contained closed questions. I chose to use this questionnaire as one of the methods to collect data because in this study I am researching the learners and in most cases learners in rural settings are shy to express themselves verbally in front of an adult. Furthermore, as the writing skills of many learners are not well-developed, it is easier for them to indicate responses with a tick or cross, rather than write responses to open ended questions. Section A of the questionnaire consisted of two questions requesting biographical information. It required learners to provide their age and gender. They were not required to provide their names to ensure anonymity. Section B consisted of 23 close-ended questions. Each question consisted of five options from which the learners had to choose. The options were strongly agree, agree, disagree to strongly disagree and unsure. The closed questions of Section B had two parts; part one had statements which required data with regard to learners' experiences of Science in Grade Seven. Part two of Section B contained statements with regard to learners' experiences of learning science in Grade Eight. The learner questionnaire was used to elicit information of learners' experiences of the transition between primary and high school with regard to science learning. I was present in class when learners answered the questionnaires so as to clarify (in isiZulu, their home language) if any of the questions were not clear to the learners. The questionnaire was administered to learners towards the end of May 2012. This seemed the ideal time as learners would have been in high school for almost two terms and therefore would be able to make valid comments because by that time they would have experienced the differences between how Science is taught in high school compared to primary school (Braund & Driver, 2005). The administration of the questionnaire in May 2012 was also ideal considering the fact that the data about Grade Seven was going to be collected from the very same learners. Therefore waiting till later in the year could have had some implications. Some learners might have forgotten what was happening in their grade seven classes as the questionnaire required them to refer back to what and how science was taught in primary school. I am of the view that having spent almost two terms in Grade Eight learners would be in a better position to respond accurately to the questionnaire. The data generated from the learners' questionnaire formed part of the quantitative data collection mentioned earlier and constitutes the quantitative approach to the study. While the rest of the data collected were qualitative, this data set supports and strengthens the qualitative part of the study. Although the data generated by learners' questionnaire was quantitative, I did not

pilot the questionnaire. Since this was a small scale survey as only one section of grade eight learners from each of the two high schools were involved in the study.

I also administered open-ended questionnaires to primary school teachers (Appendix K). Cohen, et.al (2011) refers to such questionnaires as semi-structured questionnaires and states that it sets an agenda as to what questions need to be answered but does not presuppose the nature of the response. They further say that while semi- structured questionnaires have a clear structure, sequence and focus, the format is open- ended and allows the respondents to answer the questions in any way they wish to. The two primary school teachers were requested to complete these open-ended questionnaires, although of course the biographical information requested in Section A had closed questions. These closed questions focussed on biographical information such as race, gender, age, home language, number of years teaching Natural Sciences as well as professional particulars. Open-ended questions focussed on the knowledge and process skills that teachers teach in Grade Seven. The data from the teacher questionnaires were required to elicit information on the knowledge and skills these teachers believe learners acquire in Grade Seven. This type of questionnaire enabled the primary teachers to express their comments in the way they thought best.

3.6.2 Classroom Observations

According to Johnson and Christensen (2004), the purpose of classroom observation in educational research is to observe educators in their natural settings as it normally occurs. During classroom observation the researcher can have first-hand experience with participants (Creswell, 2013). Hopkins (1993) gives four methods of undertaking classroom observation: structured, systematic, focussed and open observation.

3.6.2.1 Structured Observation

A structured observation is said to be a collection of information by either using a tally sheet or a diagram. Cohen et.al (2011) define structured observation as very systematic and are of the view that it enables the researcher to generate numerical data from observations. The researcher adopts a passive, non-intrusive role during structured observations, merely noting down the incidence of the factors being studied.

3.6.2.2 Systematic Observation

Closely related to the above method is systematic observation, which uses coding scales (Hopkins, 1993). An example of systematic observation is the Flanders Interaction Analysis Categories (FIAC), a system of interaction analysis which studies what is happening in a classroom when a teacher teaches. FIAC involves ten categories of verbal behaviour, these verbal behaviours include teacher talk, learner talk and silence or pause or confusions. Teacher talk has seven categories; learner talk has two categories and one category for silence or pause or confusions. Numbers are allocated to certain behaviours and the observer records a category every three seconds (Harvey, 2006).

3.6.2.3 Focussed Observation

In the third type, the focussed observation, an observer focuses on a particular type of teaching technique, for example questioning. Cohen et.al (2011) describes the focussed observation as narrowing one's field of observation to focus in on those problems and processes that are most relevant to the research purpose and questions.

3.6.2.4 Open Observation

The fourth method is open observation. In this method the observer records his/her observations including the interactions of the participants, description of the activities, the action and gestures of participants. Creswell (2013) asserts that qualitative observations are those in which the researcher takes field notes of the behaviour and activities of individuals at the research site.

I used the open observation method to observe teachers teaching grade eight science lessons. My observations were guided by the constructs of my conceptual framework i.e. what strategies were employed by teachers; what process skills were developed, what kind of assessment strategies were used, as well as the nature of the classroom environment. I also observed how they managed learners' transition to grade eight science classrooms.
(Appendix I)

I took extensive notes during the observations of the lessons noting the activities that were taking place in the classroom using some prepared questions that I answered (Creswell, 2013). Through these observations it was possible to observe how grade eight teachers approached their lessons and related to their learners. The skills that grade eight teachers'

expect from learners were also identified during the lesson presentation as I observed the lessons. The manner in which the learners interacted with the teacher, with each other as well as with learning material (resources) was noted. This classroom observation sought to find out to what extent teachers promote the use and development of process skills in their daily teaching. It also sought to compare the differences in assessments, the learning and teaching environments of primary and high school, as the teaching strategies used in these environments.

I recorded field notes referring to the teacher activities in the classroom, observing if questions asked during lesson presentation were open-ended or closed-ended and what process skills were being promoted during the lesson. The teaching strategies employed by the teachers could be judged in a manner in which the teachers presented their lessons. Formative assessment was also noted as the teachers were asking questions and giving learners short tasks during the lesson. Although I did not observe lessons in Grade Seven I met with Grade Seven teachers and had the opportunity to observe their classrooms.

3.6.3 Document analysis

Documents are written evidence that may shed light on the phenomenon that is being investigated (Creswell, 2013; Niewenhuis, 2007). Since documents are written evidence, it saves a researcher the time and expense of transcribing. Creswell (2013) asserts that documents represent data which are thoughtful in that participants have given attention to compiling them and enable the researcher to obtain the language and words of the participants. Documents are much more convenient to the researcher because they can be accessed at a convenient time for the researcher to analyse and they are not disturbing to participants. Documents are divided into primary and secondary sources of data (Niewenhuis, 2007). Since it was not possible to observe all activities taking place in the classes I observed, it was necessary to analyse a number of documents as well. Learners' books were reviewed with the aim to determine the types of process skills developed and this complemented my classroom observations.

Although I did not observe grade seven classes, I collected grade seven learners' workbooks and assessment books in order to obtain information about what knowledge and skills are taught in Grade Seven. In the current grade seven classes I analysed lesson plans, the

learners' workbooks and assessment books. I looked at 15 learners' workbooks and 15 assessment books in each grade seven class. These were selected on the basis of achievement: five high achievers, five moderate achievers and the last five low achievers. In learners' workbooks and assessment books I was looking for concepts and activities that reflected the evidence of process skills development.

I also collected grade eight learners' books to see what knowledge and skills are developed in Grade Eight. I wanted to find out if there is any correlation between the skills developed in Grade Seven and those developed in Grade Eight. In Grade Eight I analysed learners' workbooks. The learners' science workbooks were important documents because they contained all the concepts discussed during class room interaction. These were important since they reflected the process skills that have been dealt with.

Lesson plans and work schedules were also analysed as they contained information about assessment strategies used by teachers. I analysed learners' books in each grade eight class. The exercise books were categorised according to the level of achievement: five high achievers, five moderate achievers and five low achievers. Document analysis not only focussed on process skills. Documents such as learners' books and lesson plans were analysed for evidence of assessment strategies used by teachers during contact sessions and evidence of process skills planned for development. I also analysed these document to find out if assessment is used to enhance teaching and learning or only used for summative purposes

3.6.4 Interviews

An interview as described by Niewenhuis (2007) "*is a two-way conversation in which the interviewer asks the participant questions to collect data and to learn about the ideas beliefs, views, opinions and behaviours of the participants"* (p 87). According to Cohen, et.al, (2011) interviews are not just everyday conversations but they are question- based with a specific purpose to obtain precise information. Johnson and Christensen, (2004) point out that qualitative measures such as interviews, allow researchers to enter the inner world of another person and to gain an understanding of that person's perspective. In qualitative research interviews are categorised into three types: structured, semi-structured and

unstructured interview (open – ended). Each type of interview is determined by the degree of control exercised by the interviewer (Ndlovu, 2004).

In a structured interview, the questions are detailed and developed in advance (Niewenhuis, 2007). The questions usually look for straightforward, convergent answers. Niewenhuis (2007) argues that if questions are overly structured they inhibit probing. Semi-structured interviews are more flexible compared to structured interviews in that they allow the researcher to ask more probing questions other than the prescribed ones. Creswell (2013) asserts that the purpose of using semi-structured interviews is not only to follow up on ideas and probe responses from the participants but also to gain in-depth data from participants and to find out what lies behind their actions. The semi-structured face-to-face individual interviews offers flexibility and freedom to participants. However, the semi-structured nature of this kind of interview enables the researcher to make comparisons of responses since the participants are answering the same questions. This also assists in organisation and analysis of data (Cohen et al., 2011). Unstructured interviews are sometimes referred to as open-ended (Maree, 2007). Cohen et.al (2011) assert *"unstructured interview is an open situation, having greater flexibility and freedom"* (p.415). Kerlinger, cited in Cohen at.al, (2011) further states that in unstructured interview research purposes guide the questions asked but their content, sequence and wording are up to the researcher entirely. According to Maree, (2007) in an open ended interview the researcher explores with the respondents her or his views, ideas, beliefs and attitudes about certain occurrences in the form of a conversation. However, the fact that unstructured interviews are more casual requires more careful planning (Cohen, et al., 2011).

3.6.4.1 Teacher Interviews

In the light of the above discussion I employed semi- structured face-to-face interviews with two grade eight teachers (Appendix J); each interview lasted about half an hour. I developed the interview schedule with a purpose of gaining in-depth data from the participants and to find out what grade eight teachers' expectations are with regard to the skills learners bring from primary school. The interview was carried out in the schools where teachers worked for the sake of easy accessibility and saving time. The interviews were conducted between May and June 2012 and the dates and times of the interviews were determined by the teachers. I understood that I was intruding in the teachers' lives by asking them questions relating to

their teaching. Therefore I started by building rapport between myself and the teachers beforehand. This was done by explaining the main aim of conducting this research study in an informal manner. Johnson and Christensen (2004) state that the interview should be friendly and that the researcher should be impartial to whatever the interviewee says to him/her. These interviews were to elicit information about what skills the teachers expect the learners to demonstrate when they enter grade eight. The interviews were conducted in English and were audio taped.

3.6.4.2 Focus group interview (FGI) - learners

A focus group interview is, according to Lederman (1990) '*a technique involving the use of in-depth group interviews in which participants are selected because they are a purposive, although not necessarily a representative sampling of a specific population; this group being 'focused' on a given topic'* (p.117). According to Nieuwenhuis (2007) focus group interviews produce data that are rich in detail and difficult to achieve with other research methods. Furthermore Johnson and Christensen (2004) state that focus- group interviews are useful for providing in-depth information in a short period of time. The focus group interview has its strengths and limitations (Lederman, 1990). According to Niewenhuis (2007) literature has reported some limitations that the FGI has. Firstly focus group participants are typically small in number and may not be representative. Secondly, participants are expected to meet as a group in the same place at the same time and this may be potentially difficult if the participants live in geographically distant areas. However, Lederman (1990) argues that *"the group potentially provides a safe atmosphere, a context in which the synergy can generate more than the sum of individual inputs and further states that the data generated in FGIs are often richer and deeper than data elicited in the one-on-one interview situation* (p. 119)."

This study employed focus group interviews (Appendix M) with the purpose of probing and gaining more insight into learners' responses in the questionnaires. The focus group interview was employed in this study to discuss the learners' experiences as they transit from primary to high school classrooms with regard to the teaching and learning of Natural Science. The participants were informed well in advance about the focus group interview and what it entailed. Each group consisted of six to eight grade eight learners and the interviews lasted approximately thirty minutes. The focus group interview was in English but the learners were allowed to use isiZulu to answer the questions if that made them more comfortable. Affording the learners a chance to discuss in isiZulu enabled them to say whatever they

wanted without the barrier which is normally caused by the use of the English language. This did not only help the learners but me as well in that I was able to get the most out of the learners. The focus group interviews were audio taped with the consent of the participants. I transcribed conversations and translated them into English.

3.7 DATA ANALYSIS

Creswell 2013 defines data analysis as the process that involves making sense out of the text and image data. He further says that it involves preparing the data for analysis, conducting different methods of analyses, moving deeper and deeper into understanding the data. I went through the data several times. I listened to audio tapes of interviews and classroom observations over and over again to gain deeper understanding of the data and to ensure thorough analysis. Merriam (1998) states that data analysis is a very challenging and complex process that requires moving back and forth, scrutinising every bit of the information to construct meaningful ways to present the data. I transcribed the data obtained from interviews for teachers' and learners' focus group interviews as well as classroom observations typing up field notes. I then read through all data to gain a general sense of the information. Having read all the data then I sorted it into categories, searching for the text that matched the themes (Niewenhuis in Maree, 2007). The themes were identified beforehand from the literature review and used to inform the conceptual framework. The constructs used to build my conceptual framework were therefore the themes I used in organising my data.

3.7.1 Questionnaires

The questionnaires were analysed differently as one questionnaire produced quantitative data and the second questionnaire produced qualitative data.

3.7.1.1 Learner Questionnaires

The learner questionnaire was analysed quantitatively by entering the learners' responses on excel spread sheets to get quantitative results. Frequency tables were developed from the learners' responses for each category. Percentages were calculated for each category and used to draw graphs. The learners' responses were compared in terms of their experiences of science in Grade Seven and their experiences of science in Grade Eight. I did not draw graphs for each question in the questionnaire but decided to put the responses for experiences which were related, in the same graph. For example, learners' responses to an experience in Grade

Seven and responses to an experience in Grade Eight, that was included in the same theme, were presented in the same graph. This made comparisons easier.

I analysed the data produced from learner questionnaires using the conceptual framework by placing responses under relevant constructs. The questions in the questionnaire were formulated in relation to constructs; process skills, teaching strategies, as well as assessment. Analysis of the data confirmed that I could use the above constructs as themes as all the data fit into these themes. The sub-constructs cooperative learning and practical work of the construct teaching strategies were used to analyse the data relating to group work and teacher demonstration versus practical work respectively. The learner questionnaire also elicited data about learners' experiences of Science in grade seven as well as in grade eight classes.

3.7.1.2 Teacher Questionnaires

The teacher questionnaire elicited data about the development of process skills in Grade Seven and teaching strategies used. Grade Seven teachers were the only ones who filled in the teacher questionnaire. Teachers' responses from the questionnaires were read searching the data to find differences and commonalities. The data gathered was categorised and allotted to relevant themes. Themes were further analysed using the sub-constructs in the conceptual framework. Data about teaching strategies was analysed using the sub-constructs teacher-centred versus learner-centred. Data regarding process skills was analysed using the sub-constructs process skills.

3.7.2 Classroom Observations

To analyse the data produced from the classroom observations I used the following constructs; process skills, teaching and learning environment and teaching strategies. The sub-construct for process skills that I used for analysing data about how science is taught were comparison, measurement, classification, observation, communication and experimentation. The aspects of learning and teaching environment that I used to analyse the data relating to the teacher expectations in terms of science skills and knowledge learners' possess was teacher attitudes. Classroom displays were also noted even though this aspect did not inform the construction of the instrument. These aspects determine to an extent the conduciveness of the classroom for learning as significant differences between grade seven and eight classrooms could also affect learners. The sub-construct homework was also used

to compare the learning environment of Grade Seven and Grade Eight in terms of frequency and volume of homework. All of these observations allowed me to assess how teachers managed the transition of learners from Grade Seven to Grade Eight. Three lessons were observed for each grade eight teacher.

3.7.3 Interviews

The two types of interviews were analysed and produced different sets of data.

3.7.3.1 Teacher Interviews

After transcribing all the interviews I asked the participants to read the scripts to confirm if what I had written was really their responses as they uttered them. I read the transcripts thoroughly to gain in-depth understanding of the data. I analysed the data that I elicited from the interviews by grouping common ideas into the predetermined themes. I used the constructs process skills, assessment, teaching strategies to determine the themes. The data that emanated from teacher interviews was addressing questions about teacher expectations from grade seven learners as they enter Grade Eight with regard to the constructs mentioned above as well as the way teachers thought they managed the transition of learners from Grade Seven to Grade Eight

3.7.3.2 Focus group interviews

Focus groups were used to follow up learners' responses from the questionnaires. The questions for the focus group were elicited from the learner questionnaire. The data produced through the focus group interviews were about learners' experiences of transition with regard to learning and teaching of science, enjoyment of Science and homework. The question was asked and learners were given an opportunity to discuss the question expressing their views. The constructs cooperative learning approaches versus individual learning approaches as well as practical work and inquiry-based learning versus teacher demonstrations was used to analyse the data generated through focus group interviews.

3.7.4 Document analysis

Learners' workbooks and assessment books as well as teachers' lesson plans and work schedules from the two grade seven classes as well as the two grade eight classes were analysed to determine the types of process skills teachers focussed on in Grade Seven and

Eight respectively. Lesson plans provide information about teaching strategies and forms of assessment used by the teachers in both contexts (Primary and High school). Data about assessment strategies used by teachers was also elicited from learners' books. The conceptual framework provided the constructs which guided the analysis of the data. The constructs were assessment, process skills and teaching strategies.

3.8 RIGOUR OF THE RESEARCH

As mentioned earlier, this study employed a mixed method approach. Therefore the aspects of rigour that will be discussed for this study are validity and reliability for quantitative measures. For qualitative measures the aspect of rigour that will be discussed is trustworthiness.

3.8.1 Validity, Reliability and Trustworthiness

Validity is an important aspect for effective research (Cohen et al., 2011) ensuring that the data collected is truthful and correct. Validity refers to the extent to which a questionnaire measures what it is intended to measure. In quantitative research validity could be improved by careful sampling and appropriate instrumentation (Cohen, Manion & Morrison, 2005). They assert that it is impossible for research to be one hundred percent valid but invalidity may be reduced by ensuring internal validity, external validity and content validity. Internal validity refers to the degree of accuracy research data is able to explain the phenomena that is being researched. External validity refers to the degree to which the results of the research can be generalised to other cases or situations. Content validity refers to the fact that an instrument equitably covers that which it intends to cover (Cohen et.al, 2005).

In ensuring validity for the quantitative questionnaire some questions were cross checked to test for the valid answers. The questions which were used in the questionnaire were also asked during the focus group interviews to determine if they would yield the same answers. The validity of the instrument in this study was ensured by giving it to the study supervisor who is an expert in this field to double check if the questionnaire measure what it purports to measure. I also ensured validity by using the sample which is representative and not too small or large. The teacher questionnaire was only filled by two teachers, so confirming responses with teachers was not a problem; hence I arranged a meeting with each one of them to confirm their responses.

Reliability refers to the consistency of the measure. An instrument (questionnaire) is considered reliable if it produces the same results when it is re-administered (Delport & deVos, 2005). Lubisi (1998) defines reliability as the extent to which the research can be replicated or reproduced and still expect to find similar results. According to Cohen et.al (2011), reliability in quantitative research concerns precision and accuracy and being able to demonstrate similar results if it were to be carried out in similar respondents and similar contexts. I endeavoured to ensure reliability by including in my sample two different high schools and checked whether learners' responses were similar. As I worked with only two high schools, this is not a large scale study and its nature is more qualitative than quantititative and therefore the typical requirements of a quantitative study do not apply.

This study uses the data from different sources to help in checking the findings. Nieuwenhuis (2007) asserts one has more confidence in the research results if the data from different sources points to the same conclusion. According to Lincoln and Guba (1985) the key criteria for trustworthiness are credibility, applicability, dependability and confirmability. Triangulation and credibility was ensured through the use of different types of data collection instruments. Lincoln and Guba (1985) elaborate on each criterion; they define credibility as the confidence in the truth of the findings and transferability as concerned with showing that the findings can be applied in other contexts. In other words, the findings may be applied to similar contexts, but not to all contexts, as typical large scale quantitative findings can. Dependability is more often used in qualitative research and is equated with reliability. The third criterion is confirmability which is a degree of neutrality in the research study and not researcher biased (Lincoln & Guba, 1985). This refers to the level of researcher objectivity and impartiality during data collection. For qualitative validity the researcher checks for accuracy of the findings by verifying and validating the findings through providing the draft copies to the participants for oral comment, using multiple data sources, and keeping the notes of research decision taken (Nieuwenhuis,2007).

In the light of the above discussion I ensured trustworthiness of the data by returning the interview transcripts to the teachers to read and confirm the accuracy of what had been said during the interview. I also asked the interviewees to contact me if they wished to clarify any verbal comments. Guba and Lincoln cited in Cohen, et.al, (2011) argues for the need of replacement of the conception of positivist validity in qualitative research by the conception

of authenticity. I therefore ensured validity which could be equated to authenticity by choosing natural science teachers who were natural science specialists in their training rather than anyone who is just teaching Natural Science for the sake of being given the learning area to fill the duty load. In addressing the issue of reliability and validity of the findings of this study I used five data sources. Classroom observations, two types of interviews, questionnaires and document analysis were used to gather data in an attempt to answer research questions posed. Both qualitative and quantitative data was generated by these instruments. The abovementioned research data collection methods were used for triangulation to enhance the credibility and trustworthiness of the study. Triangulation is the use of two or more methods of data collection in the study of some aspect of human behaviour (Cohen, et.al, 2011).

3.8.2 Generalisability

Generalisability can be equated to transferability as they are both concerned with the fact that the findings of the study can or cannot be applied in a different context. Transferability is a means of showing that the findings have applicability in other similar contexts; it intends to establish the extent to which findings from the study can be used by another researcher (Denzin & Lincoln 2000). The grade seven and grade eight learners and their teachers were not representative of all learners and teachers in the Umgungundlovu district, KwaZulu-Natal or for that matter in South Africa. Therefore the results of this study cannot be generalised to all contexts.

3.9. ETHICAL CONSIDERATIONS

When conducting social research it is imperative to obtain the consent and co-operation of participants who are to assist in investigations and superiors in the institutions or organisations providing the research facilities (Cohen & Manion, 1994). First and foremost I started by asking permission from the University by applying for ethical clearance and the protocol was granted full approval with reference number HSS/0107/012M (Appendix A). Before the commencement of data collection, I ensured that I obtained permission from the Department of Education KZN (Appendix B). Thereafter, I wrote a letter to the Ward Managers of Vulindlela Circuit requesting permission to conduct the study (Appendix C). The letter explained the purpose of the study, how the data would be stored after collection as well as the schools intended for the study. Furthermore, permission was obtained from the

principals of the participating schools (Appendix D). The natural sciences teachers and their learners who participated in the study gave their informed consent to participate in the study (Appendix E and Appendix H). The parents were also asked to give their consent for their children to participate in the study (Appendices F and G). The participants were informed that their involvement in the study is voluntary and that they could withdraw from the study at any time should they feel it is necessary to do so. They were also assured that their identities would not be revealed. To ensure the anonymity and confidentiality of the participants, I ensured that the questionnaire did not contain any spaces where the participants would be required to write their names. I also ensured that the names of the schools and teachers involved in the study were not used. The two schools and teachers involved were given pseudonyms.

3.10 LIMITATIONS

The limitations experienced were due to the timetable constraints that I was given by the participants as I had to collect the data during school time. There were periods that clashed which increased my stay at a school. I collected data towards the end of the term so teachers were about to finish the work schedules for the second term. The language of learning and teaching in all the schools involved in the study is English, the study was also in English with the exception of focus group interviews where learners were free to answer in isiZulu, the language they felt comfortable with. English language proved to be a limitation. A number of learners indicated that they were unsure of many of the questions in the questionnaire, even though I was in class with them to attend and explain any of their queries. The reasons could be the fact that they did not understand questions quite clearly as the questionnaire was in the second language and therefore chose the unsure response when filling in the questionnaire. The questionnaire could not be set in isiZulu because schools use English as the LOLT. Schools are promoting the use of the first additional language amongst the learners. Secondly setting the questionnaire in isiZulu would not be appropriate as it would have been difficult to translate other scientific words into isiZulu as we do not have such vocabulary in our language. For example words such experiments have no equivalent in isiZulu.

3.11 CONCLUSION

In this chapter, the paradigm, approach and research design were discussed as well as the settings of the schools that participated in the study. A number of data collection methods used in the study were discussed in depth, explaining how the data were collected. Different methods of collecting data were used in order to improve the trustworthiness and validity of the findings. I also explained how I used my conceptual framework to analyse the data, as well as the ethical issues I considered when conducting this study. In the next chapter I shall discuss my findings based on the analysis of the data pertaining to the teaching and learning of Natural Science in Grade Seven as well as learners experiences of the transition from Grade Seven to Grade Eight.

CHAPTER FOUR

FINDINGS AND DISCUSSION- THE TRANSITION FROM GRADE SEVEN TO GRADE EIGHT

4.1. INTRODUCTION

Although my study focuses on grade eight learners, their experiences of Grade Seven, and grade eight teachers' expectations of grade seven learners form an important part of the study as it speaks to the transition from Grade Seven to Grade Eight. In this chapter I present the findings obtained from the analysis of the data relevant to the above. My findings are framed by the themes that emerged from the literature reviewed in Chapter Two, which served to build my conceptual framework used in this study. I have used both qualitative and quantitative data to formulate the findings which enabled me to answer the first two research questions.

4.2 NATURAL SCIENCE PROCESS SKILLS ACQUIRED BY LEARNERS IN GRADE SEVEN

Learners are expected to acquire science process skills throughout their primary school years. In this section I report on the skills learners in this study have in Grade Seven, their last year in primary school. These are the skills they are expected to take with them to high school. The findings enabled me to answer my first research question: *What Science skills do learners acquire in Grade Seven?*

Documents such as workbooks as well as the teacher questionnaire provided the data which enabled me to develop the findings to answer this question. The findings to answer this research question are based on learners' actual work, lesson plans as well as teachers' views of how they assist learners in acquiring these skills.

According to the (DoE, CAPS, 2011), by the time learners complete the Senior Phase they are expected to have been assessed in a number of process skills at a grade appropriate level. DoE, CAPS, (2011) is an amendment of (DoE, RNCS, 2002) aimed at improving implementation (p.4). These are some of the skills that learners could be expected to have acquired in Grade Seven. In Chapter 1 I listed more science process skills than these below.

The skills listed below are mostly largely science process skills which form the foundation for acquiring more complex integrated process skills. It is therefore made sense to me to focus mostly on these skills as I expected that grade seven teachers would have covered them.

- Observation
- Classification
- Comparison
- Communication
- Experimentation
- Measurement

Mr Maseko and Mrs Jama's views of what they do and what they believe learners learn in Grade Seven is reported for each of the above-mentioned skills as presented in my conceptual framework.

4.2.1. Observation

Observation is the principal process skill which entails gathering information about an object or organism through the use of any one or combination of the five senses namely sight, smell, taste, touch and hearing. According to the two grade seven teachers, they do facilitate the development of observation skills.

On the question of observation, Mr Maseko's response reflected that he gives the learners opportunities to observe different organisms. The examples that he gave were: How the lizard moves and how the locust feeds, as well as observing the number of legs invertebrates such as insects, arachnids and crustaceans have. Activities in learners' workbooks revealed that what Mr. Maseko said in the questionnaire is indeed in line with what he does in class. Learners' workbooks show a range of activities that are aimed at developing the skill of observing. As skills are often integrated, the activity on measurement (to be discussed under that heading), included taking readings which required keen observation skills.

Mrs Jama's response shows that she also affords the learners the opportunity to observe; the topic in which the observation was facilitated, was convection. Learners had to observe convection currents in water. Mrs Jama's response was also confirmed by activities in learners' workbooks. Apart from the above activity, activities related to the theme Life and

Living were also included. One example required learners to observe the difference between monocotyledonous and dicotyledonous plants.

Although both teachers' lesson plans did not specifically state the skills that were to be developed, the activities often included the development of more than one skill, careful analysis showed that grade seven learners were afforded opportunities to develop the skill of observation. Evidence of this was provided by their recorded observations in their workbooks.

4.2.2 Classification

Classification is the process of grouping organisms or objects on the basis of observable characteristics.

Mr Maseko responded that he did facilitate the development of classification skills in his learners. He supplied examples of activities where this is applied i.e. classification of animals into vertebrates and invertebrates and classification of plants into flowering plants and non-flowering plants. The activities given to learners do reflect a certain level of classification. Learners' workbooks reflected activities on classification of plants as angiosperms and gymnosperms. Workbooks also provided evidence on classification of materials into conductors and insulators.

Mrs Jama's response reflected that she does ask learners to classify and an example given was classifying plants and animals into their respective Divisions or Phyla respectively. Learners' workbooks reflected that they were required to use observable characteristics to classify animals into vertebrates and invertebrates. Learners were also given exercises where they were required to classify household substances as acids or bases. They were also given the task to group invertebrate animals into insects, arachnids and crustaceans, based on their external characteristics.

Teachers clearly stated in their lesson plans that they aimed at developing the skill of classifying. The fact that the majority of learners were able to classify correctly in the given activities, is an indication that they had acquired the skill of classification.

4.2.3. Comparison

The skill of comparison requires learners to note the differences and similarities between objects. In Science these objects are mostly organisms or even pictures of organisms.

Mr Maseko indicated that he gives his learners activities in which they are required to compare and contrast objects and organisms. He provided two examples of activities where learners are expected to compare dicotyledonous and monocotyledonous plants; acids and bases. Learners' workbooks revealed activities done in class where learners were required to write down the differences between dicotyledonous and monocotyledonous plants. Another example required learners to name the differences between the properties of solids, liquids and gases i.e. solids have fixed shapes, liquids do not have a shape but takes up the shape of a container and gases do not have a shape. A further example from Mr Maseko's learners' workbooks required learners to compare the sizes of the planets and their distances from the Sun, using a given table with information. Learners were required to list the planets from the largest to the smallest and from the one closest to the sun to the one furthest from the sun.

Mrs Jama also responded positively to the question that pertains to the development of the skill of comparison. She stated that her learners compared energy-efficient convection devices, ranging them from the most energy-efficient to the least energy-efficient device. She also provided examples where learners compared kinetic energy of water at different temperatures. Besides the activities that Mrs Jama mentioned in answering the questionnaire there were other activities in learners' workbooks, one of which required learners to compare and contrast metals and non-metals and write down the properties which made them classify an object as a metal or non-metal.

Document analysis revealed that activities that required learners to compare were done in class. Lesson plans revealed comparing as one of the skills that were aimed at being developed in certain activities. From the sample of workbooks analysed a number of learners were able to compare and noted the expected differences and similarities indicating some level of acquisition of this skill.

4.2.4 Communication

This is a skill in which learners are expected to be able to report information orally and in written form. In communicating science information in writing, learners may use different forms of communication such as paragraphs, essays, tables, diagrams, graphs, charts including flow diagrams and mind maps to communicate their findings. The question asked teachers if they provide opportunities for learners to communicate information in different ways.

Mr Maseko's response did not reflect clearly the ways in which his learners communicated information. Although he mentioned that they discuss in groups, do their own experiments and do their own research it is not clear how they communicate the information gathered from their research and experiments. However, in the assessment books there were some diagrams, for example the learners were required to draw a diagram to show how convection currents flow in the room when the heater is on.

Mrs Jama's response reflected that she does afford learners an opportunity to communicate their findings using different ways. She gave examples of the ways in which this is done: learners observe and communicate their findings through drawings. She indicated that she also asks learners to report their findings through presentation to the whole class. Learners work books revealed activities that required learners to draw conclusions after a demonstration lesson. This activity had questions which required learners to write down, step by step, how the teacher set up the apparatus for distillation. For this question there was no response in most of the learners' workbooks. Another question asked learners to explain exactly what happened to water vapour as it moves from the distillation flask to the collecting beaker. Again learners struggled to explain exactly what happened. I noted that they had an idea but could not clearly state it. The question that required learners to state where the salt crystals were collected was mostly answered with ease. The last question required learners to draw conclusions from the experiment. This question was also not answered by most learners.

In communicating science information learners could also present information through flow charts and mind mapping. Teachers were asked if they encourage their learners to develop flow charts or mind maps to show their understanding of scientific concepts. Both teachers

replied that they do encourage their learners to develop flow charts or mind maps. When providing the examples of topics where this approach was used however, teachers only gave examples of food chains and food webs, Learners' workbooks did reflect some food chains; however food chains are not examples of flow charts or mind maps. There appears to be a poor understanding of the meaning of mind maps and flow diagrams; therefore for both teachers the learners' workbooks did not provide any evidence of activities that required learners to use mind maps or flow charts.

Learners' workbooks revealed that communicating science information as a skill is developed to some degree. Although lesson plans did not reflect any intention planned by either of the teachers to develop this skill, analysed work books do show some evidence of the development of communication skill in the form of drawings. No other form of communication skill was evident in learners' workbooks. Most learners were not competent in demonstrating the skill of communication, especially where they were required to draw conclusions about their observations. There were blank spaces indicating that they are unable to communicate their conclusions. The skill of communication requires learners to be able display information verbally or in a written form as posters, essays, short paragraphs etc.

4.2.5 Experimentation

Experimenting is one of the integrated process skills which require learners to be able to conduct scientific tests or simple investigations. Experimentation involves a series of steps that a learner should perform. These steps involve formulating a testable question, formulating a hypothesis as a possible answer to the question and identifying variables. Teachers were not asked this question directly, but were asked if they always demonstrate experiments to learners. While the purpose of this question was to find out if teachers do demonstrations, I also believe that they would indicate if they did indeed allow learners to plan and conduct investigations. By observing teachers doing demonstrations learners are expected to be able to identify the equipment and record their observations.

Mr Maseko responded by stating that he sometime does. He ensured that learners know and are able to identify the equipment for the experiment by explaining each piece of equipment as to what it is and what it is used for. He gave the example of a measuring cylinder and that it is used to measure volume.

Mrs Jama responded to the same question by explaining that she ensured that learners know and can identify the equipment by giving the learners' copies of pictures of the equipment and their names. She further explained that the learners then matched the equipment on the picture to the real object (equipment) in that way they will know them.

Another question on experimentation asked teachers if they allow learners to identify phenomena to be studied or they provide the topic to be studied, when they teach learners to conduct investigations. Both teachers replied that they provide the phenomena to be studied and learners conduct the investigation but for both teachers, learners' workbooks did not reflect any activity where learners were expected to conduct investigations. Experimentation pertains to active learner involvement in practical work ensuring that learners are acquiring the skill. The absence of activities in learners' workbooks related to experimentation suggests that teachers do not teach grade seven learners the skill of experimenting.

While learners may acquire certain skills such as hypothesising related to investigation, when observing teacher demonstrations, they cannot prove their own hypotheses correct or not, unless conducting the actual investigation. Demonstrations therefore have limited value.

4.2.6 Measurement

Measurement involves the learner in using instruments accurately (DoE, RNCS, 2002). It is also a way of quantifying observations (DoE, RNCS, 2011). As mentioned in Chapter Two, science process skills are interdependent and more than one skill can be applied and displayed in a single activity. Measuring is one of the skills where learners would have to apply and display the competency in the skill of observing acutely in order to be able to measure quantities accurately. Both teachers responded with a 'yes' to the question on teaching the skill of measuring and both further explained how they do it.

Mr Maseko only mentioned that he uses the displacement method for measuring the volume of solids. Activities relating to the skill of measurement are evident in Mr Maseko's learners' workbooks as there are activities where learners are required to measure the volume of a stone by displacement. Learners' workbooks for Mr Maseko also reflected other activities that required them to measure objects. For example in Matter and Materials learners were required to measure the mass of a liquid. They first measured the mass of the glass beaker,

observed and took a scale reading, then added water to the glass beaker observed and took the scale reading again. The activities that related to measuring were limited.

Mrs Jama explained that she used the ruler to teach the skill of measurement. Learners measured the length of the sides of the cube. They used the measurements (lengths) to calculate the volume of the cube. There was no evidence for measurement in learners' workbooks for Mrs Jama.

Measurement is a practical skill that learners need to practice to become proficient. The findings suggest that the skill of measurement is not practised widely, affording little opportunity for the learners to practice the skill.

4.2.7 Discussion

Teachers' responses to the process skills they facilitate are mostly confirmed by activities in learners' workbooks. However, there are skills that are not confirmed by learners' workbooks though teachers indicated in the questionnaire that they teach them. Experimentation is one such example as the learners' workbooks of both teachers are devoid of evidence of any activities related to investigations. The findings on experimentation suggest that Science classrooms are still dominated by teacher demonstrations rather than active learner involvement in practical activities. The findings further reveal that there is little or no opportunity for learners to conduct practical investigations. Mrs Jama's learners' workbooks did not confirm the skill of measurement either. Communication skills are also sorely neglected. Learners appear unable to communicate findings or observations in writing. Some skills get more attention than others for example observation, classification and comparison. These skills were covered fairly well in activities of the two strands (Life and living and Matter and materials) that were covered by the time of data collection. Measuring is very limited. Assessment tasks showed that process skills were rarely assessed formally. This may impact on learners' motivation to practice these skills. As the acquisition of process skills is related to Learning Outcome One, they should be assessed, and by not doing so, learners proceed to High School without the necessary skills.

In conclusion, the findings show that the teachers in my study focus on some process skills and neglect others. As the process skills included in my conceptual framework were selected from the RNCS document, there is an expectation that learners acquire these skills and are proficient in them when they transit from primary school to high school.

4.3. THE TRANSITION TO HIGH SCHOOL – THE LEARNERS' EXPERIENCES

The literature discussed in Chapter Two alluded to the difficulties learners may experience when making the transition from primary school to high school. My conceptual framework includes constructs such as differences in teaching strategies, teacher attitudes and assessment that may influence this transition. Further sub-constructs included in this framework that frame the findings discussed below are teaching strategies such as cooperative learning, practical approach, homework and teacher attitudes.

To enable me to understand how learners are affected by the transition from primary to high school, it was important to obtain information from learners themselves. Data from the grade eight questionnaire, as well as focus group interviews enabled me to develop the findings to answer the second research question:

How do learners experience the transition from primary to high school with regard to science teaching and learning?

The questionnaire contained a number of questions and grade eight learners' responses are presented quantitatively as graphs. Findings from the focus group interviews elaborate on these responses. Although the responses strongly agree, agree, disagree and strongly disagree are presented separately in the graph, agree and strongly agree are discussed as a joint percentage of responses. The same applies for disagree and strongly disagree. I have used the same approach throughout.

As I have indicated in Chapter Three, certain questions were grouped together as they were deemed to relate to the same aspect (Appendix K). For example questions relating to experiences with regard to the same aspect in Grade Seven and Grade Eight are presented in the same graph to make comparisons easier. Every graph therefore presents a response to more than one question.

4.3.1. Enjoyment of Science

Figure 4.1 addresses question one and question eleven of the learners' questionnaire. These two questions are addressed in this graph because they sought to compare the learners' grade seven and eight levels of enjoyment of Science.

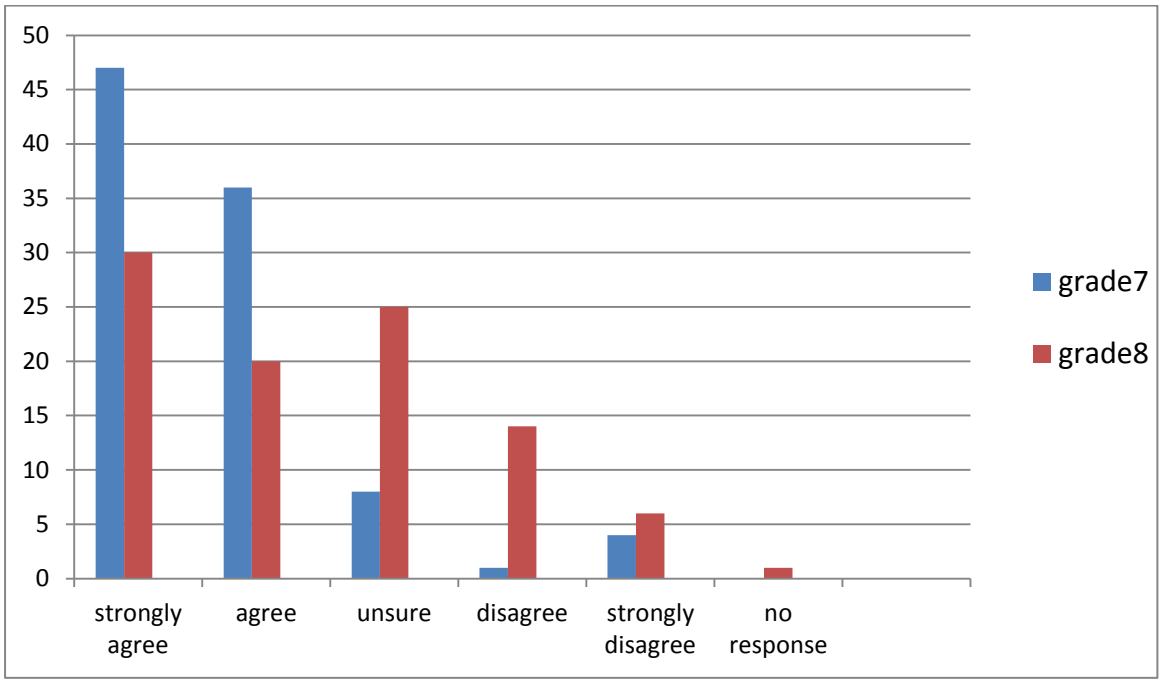

Figure 4.1: Enjoyment of Science

The graph shows that 83% of the learners strongly agreed and agreed that they enjoyed Science in Grade Seven while 5% of learners disagreed and strongly disagreed that they enjoyed Science in Grade Seven. In other words, the second group of learners did not enjoy Science in Grade Seven. The learners who were unsure as to whether they enjoyed Science in Grade Seven or not constituted 8% of the total number of learners. The graph also reveals that the enjoyment of Science in Grade Eight declined compared to enjoyment of Science in Grade Seven. The enjoyment of Science declined from Grade Seven to Grade Eight by 33%. The percentage of learners in Grade Eight who strongly agreed and agreed that they enjoy Science constitutes 50%. The number of those who disagreed and strongly disagreed that they enjoy Science in Grade Eight increased to 20%, meaning that they did not enjoy Science in Grade Eight. It is interesting to note that 25% of learners were unsure whether or not they enjoyed Science in Grade Eight. Only 1% of learners did not respond to the question.

Considering the findings presented above it may be concluded that the enjoyment of Science in high school is lower than that in primary school. There was a considerable drop in enjoyment between Grade Seven and Eight. Responses from the focus group interviews support the findings presented in the graph. It transpired that most learners enjoyed Science in Grade Seven more than they do in Grade Eight. When learners were asked to describe what made them enjoy Science in Grade Seven the following responses emerged:

[Key: FGI-Focus group Interview; L-learner]

FGI 4: L1: I enjoyed Science in Grade Seven because we were taught by our principal Mr X. He was very understanding he would sometimes take us outside to do some.....ourselves. We would do it on our own.
R: What would you do on your own?
FGI 4: L1: Like I think the assignment was about putting the stone inside the water and the water would rise. You would see what has happened.

FGI 2: L1: Our grade 7 teacher was patient she was good at explaining things.
R: What do you mean she was patient?
FGI 2: L1: She could explain all the questions we asked. And she could give us answers in a good attitude. Until you understand.

FGI 5: L2: It's because he gave us practical work to do at home and most of the time he spent time with us helping us where we had problems showing us how to do it and going out learning about plants and other things.

FGI 1: L4: Because we did not get homework every day.

When Grade Eight learners were asked how they felt about Science, a range of responses emerged from different learners:

FGI 1:L4: I am not sure whether I enjoy Science in Grade Eight or not.
R: What makes you unsure?
L4: Because ma'am we haven't learned much.

R: but you have had a whole first term learning life and living?
L4: We liked it in Grade Seven.
R: but here in Grade Eight?
L4: because, she (the teacher) sometimes just writes notes on the board and doesn't explain them and maybe explain them after a long time.

(The tone of the voice of a learner suddenly changes to show some sort of dissatisfaction).
FGI 2:L1: No I don't. Because we have never worked in groups.

L6: Because we do not do any practical work.

L3: Because we do homework a lot.

FGI 4: L1: I don't enjoy Science here in Grade Eight sometimes I don't understand what has been said or taught because we learn new things that we have never come across before.

FGI 4: L2: Yes we used to learn in Grade Seven about things that are around us things that we could see and sometimes touch not these things like molecules and atoms.

These findings confirm that learners' enjoyment of Science declined when they transit to high schools. A number of sub-constructs were identified in learners' responses which contributed to them enjoying Science less in Grade Eight. These are: Teachers attitudes – teachers in Grade Seven appeared to be more understanding and patient in explaining concepts; the nature of homework seems to have changed in Grade eight where teachers expect learners to work more on their own than in Grade Seven. Furthermore, teaching strategies have changed; there is less co-operative learning and more individual work such as note taking and less informal practical activities.

4.3.2. Enjoyment of practical work

Figure 4.2 presents the findings pertaining to learners' enjoyment of practical work in Grades Seven and Eight. This graph deals with the responses to questions five and seventeen of the learners' questionnaire. Question five and seventeen respectively asked if learners enjoyed

practical work in Grade Seven and the same group of learners were asked if they were enjoying practical work in Grade Eight.

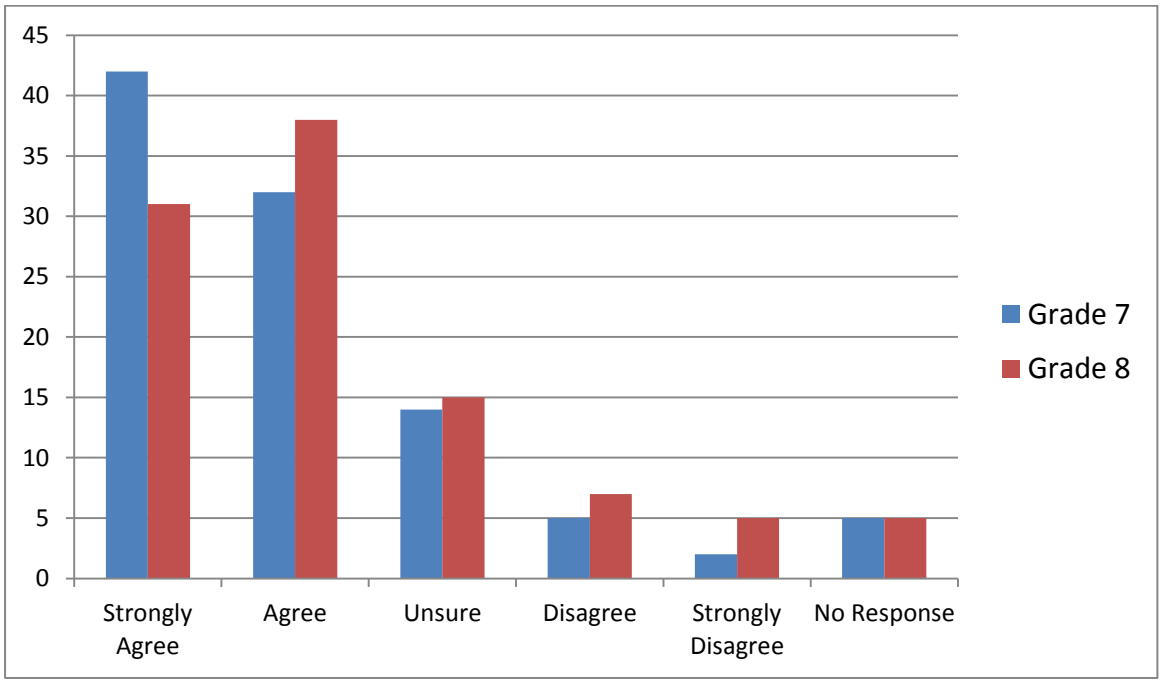

Figure 4.2: Enjoyment of practical work

Results shown in the graph reflects that 74% of learners strongly agreed and agreed that they enjoyed practical work in Grade Seven and only 7% disagreed and strongly disagreed. The percentage of learners, who were unsure if they enjoyed practical work, was 14%, while 5% of learners did not respond to the question. The graph also reveals that the level of enjoyment of practical work between the two grades did not change drastically as there is only 5% difference between Grade Seven and Eight enjoyment. With regards to practical work in Grade Eight, 69% of learners said they strongly agreed and agreed that they enjoyed practical work while 12% of learners disagreed and strongly disagreed that they enjoyed practical work in Grade Eight which shows an increase of 5% compared to their dislike of practical work in Grade Seven. Again 15% of learners were unsure as to their enjoyment or not of practical work in Grade Eight. This finding shows that learners still enjoy practical work in high school in almost the same way they did at primary school, indicating that hands-on activities are generally enjoyed by learners, irrespective of their grade.

Focus group interviews with learners confirmed that they enjoyed practical work in Grade Seven and also enjoy it in Grade Eight. However, discussions around the practical work in

Grade Eight are very ambiguous. Learners say they enjoy practical work, yet they only refer to one practical activity done in the first two terms. The second group of grade eight learners who participated in the focus group interviews only used microscopes to observe their hands and did not do any real practical work. This finding confirms that no matter how few practical activities learners did, they still enjoyed them, although the frequency of practical activities seems to decline in Grade Eight.

4.3.3 Engagement in practical work

The findings presented in Figure 4.3 are based on the following statements: *My teacher allowed us to do practical activities in Grade Seven* and *We do more practical work in Grade Eight*

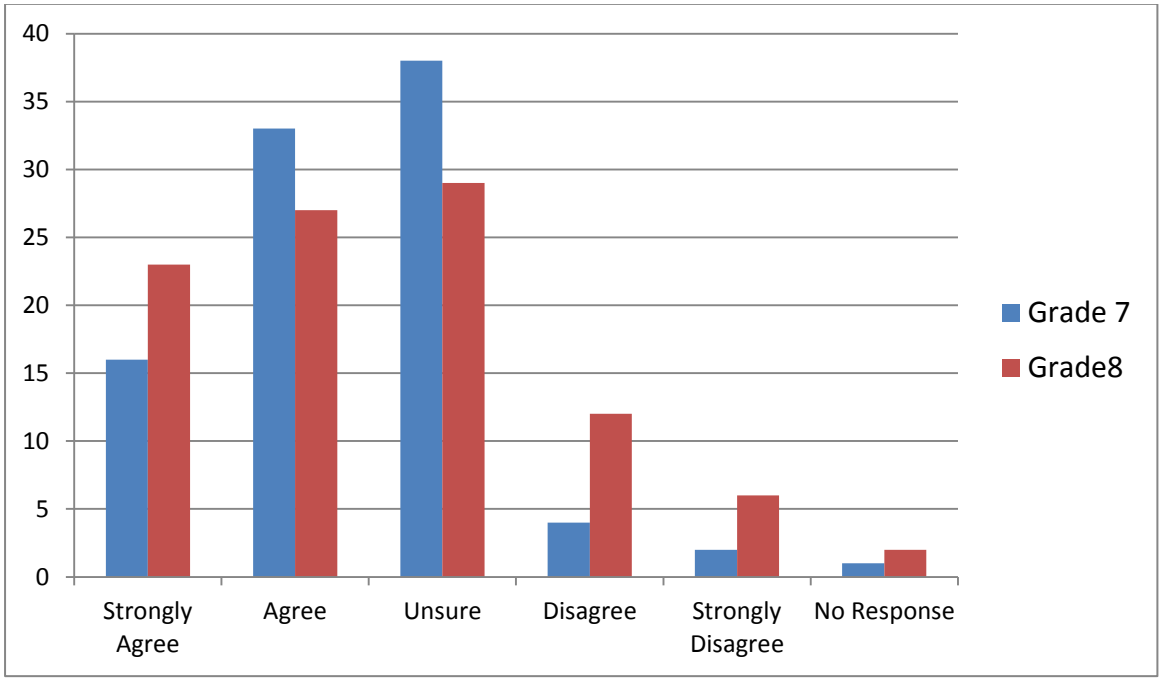

Figure 4.3: Engagement in practical work

The graph shows that 49% of learners strongly agreed and agreed that their teacher facilitated engagement with experiments/practical work in Grade Seven. A large number of learners (38%) were unsure about their engagement in practical work. Six percent disagreed and strongly disagreed about being engaged in practical work. Only 1% did not respond to this statement. With regard to the second question, 50% of learners strongly agreed and agreed that they did more practical work in Grade Eight and 29% are unsure, while 18% of learners

disagreed and strongly disagreed that they did more practical work in Grade Eight. Only 2% did not respond to this statement.

The percentage of learners who are not sure if they were allowed to do practical activities in Grade Seven and do more practical work in Grade Eight is quite large. This response contradicts learners' responses of their enjoyment of practical work in Grade Seven. I think this percentage may be accounted for by the fact that learners cannot always differentiate between a teacher demonstration and active learner involvement in practical work. As much as learners say they are engaged in practical work and enjoy it I am of the view that they are confused between being actively involved in practical activities and teacher demonstrations. According to the data revealed by the learner questionnaire the level of practical work involvement in both grades is almost the same with 49% of learners saying that their teachers facilitated engagement with experiment/practical work in Grade Seven and 50% of learners agreeing that they do practical work in Grade Eight.

Findings from focus group interviews are somewhat different from what was revealed by the learner questionnaire in terms of doing practical work in Grade Eight. Learners' discussions in Focus Group Interviews revealed that in Grade Eight learners have not been engaged in many practical activities compared to practical activities they were engaged in, in Grade Seven, confirming my explanation above. Most of the Focus Group Interviews revolved around discussion on the enjoyment of Science in Grade Seven where learners confirmed that they enjoyed practical work because their grade seven teachers would take them outside the class to learn about plants and other things.

FGI 2: L2: Ngangiyithanda ngoba besihamba siyokha izihlahla bese sibuya nazo isizofunda ngazo(I like Science because we would go outside and bring plants to the class to learn about it)

FGI 4: L6: Our teacher took us to the gardens taught and showed us things that would help us.

With regard to both aspects i.e. enjoyment of practical work and engagement with practical work, the construct teaching strategies as used in my conceptual framework shows that the strategies with regard to practical activities are different in the two grades.

4.3.4. Homework

The findings presented in Figure 4.4 are based on the following statement: *We often had homework in Science in Grade Seven* and *We get more homework in Grade Eight than we did in Grade Seven*

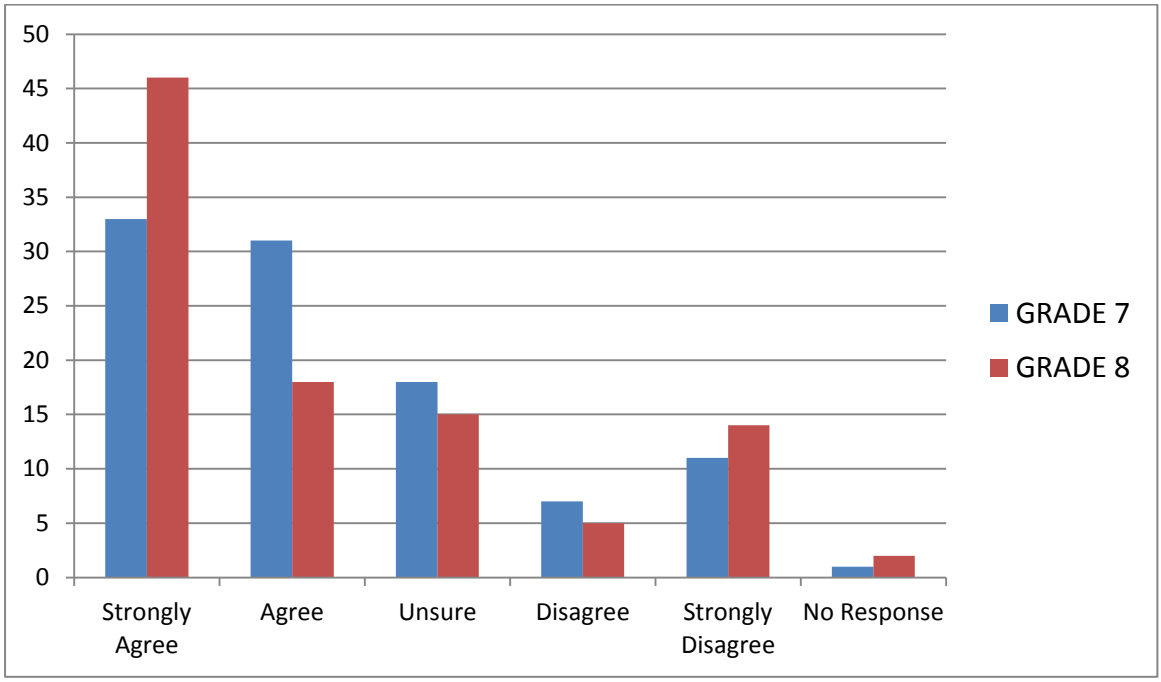

Figure 4.4: The amount of homework learners are expected to do

The findings in Figure 4.4 reflect that learners responded more or less the same with regard to homework in Grade Seven and Grade Eight. The percentage of learners who strongly agreed and agreed that they often were given homework in Grade Seven was 64%, while 18% of learners disagreed and strongly disagreed that they often were given homework in Grade Seven. The percentage of learners, who were unsure whether or not they often had homework in Science in Grade Seven, is 18%. Only 1% of learners did not respond to this statement. With regard to the second question, 64% of learners strongly agreed and agreed that they get more homework in Grade Eight than they did in Grade Seven and 16% of learners disagreed and strongly disagreed that they get more homework in Grade Eight than they did in Grade Seven. Only 2% did not response to this statement and 15% of learners were unsure.

The graph reveals that in both grades learners get almost the same amount of homework as per the percentages found. This means that in terms of homework given Grade Eight learners are not experiencing a greater need to adjust themselves to extra homework. The above

finding reveals that homework given is relatively the same in both grades. However there is still a small percentage of grade eight learners who feel that homework in Grade Eight is more than that which was given in Grade Seven.

During focus group interviews it transpired that some learners strongly felt that in Grade Eight they do get more homework than they did in Grade Seven. In one of the focus groups interview session learners stated that they do not enjoy Science in Grade Eight because they were getting too much home work.

> *R: What makes you not to enjoy Science in Grade Eight?*
> *FGI 2: L3: I don't enjoy it because we do homework a lot.*

Learners' workbooks also revealed a certain amount of homework given to grade eight learners in comparison to homework given to grade seven learners. This is supported by what was observed during class observations. Teachers did not get time to give learners class work. They would give them notes and at the end of copying the notes learners would be expected to copy the activity as homework. In the instances where learners were given classwork and the time would be too little to finish in class then the remaining activities would be completed at home as home work. Therefore, while the work given was not officially regarded as homework, many grade eight learners ended up with much work to do at home.

4.3.5. Assessment

The findings presented in Figure 4.5 are based on the following statements in the questionnaire pertaining to the writing of tests; *We never wrote science tests in Grade Seven* and *We write more tests in Grade Eight.*

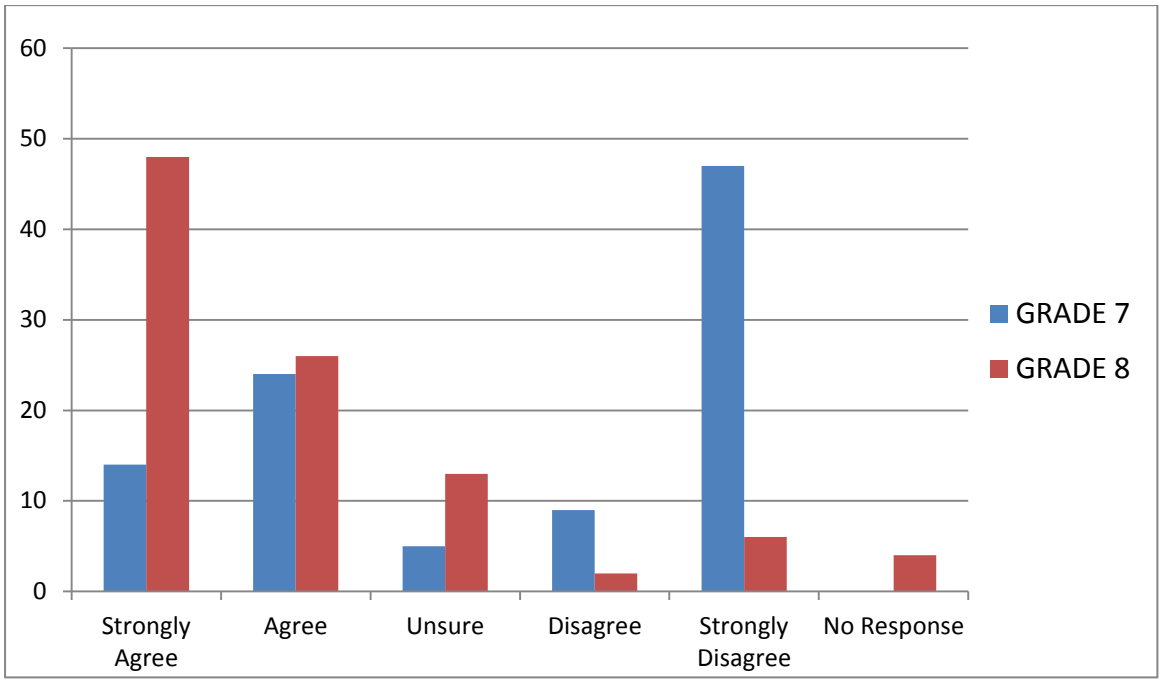

Figure 4.5: Tests written in the two grades

Figure 4.5 shows that 56% of learners disagreed and strongly disagreed that they did not write tests in Grade Seven while 38% of learners strongly agreed and agreed. This means that this percentage of learners says they never wrote tests in Grade Seven. Only 5% of learners are unsure whether they wrote tests or not in Grade Seven.

The percentage of learners in Grade Eight who strongly agreed and agreed that they write more tests in Grade Eight than they did in Grade Seven, was 74%, while 8% of learners disagreed and strongly disagreed, meaning that these learners said in Grade Eight they did not write more tests. The percentage of learners who were unsure whether they write more test in Grade Eight that they did in Grade Seven, was 13% while 4% of learners did not respond to the statement.

This finding means that learners in Grade Seven do write tests. It is however interesting to note that 38% of learners agreed and strongly agreed that they never wrote test in Grade Seven.

With regard to the second question, the graph reveals that in Grade Eight, learners write more tests than they did in Grade Seven. In grade eight learners are expected to write tests but it is not expected that they write more tests than they did in Grade Seven. Assessment guidelines for intermediate and senior phase state clearly that there are two formal assessment tasks to be performed per term in Grade Seven and Grade Eight, one of which should be a formal test. Tests are more summative than formative. Summative assessment is the assessment that is used for grading and accountability and are gathered formally (DoE, RNCS, 2002). They reflect assessment of learning rather than assessment for learning. This graph reveals that learners in Grade Eight write more tests that they did in Grade Seven. This finding reveals that indeed in high school classes although other assessment strategies are used, pencil and paper testing still dominates.

4.3.6 Working in groups

The findings presented in Figure 4.6 are based on the following statements: *We often worked in groups in Grade Seven* and W*e don't work in groups as often in Grade Eight as we used to in Grade Seven.*

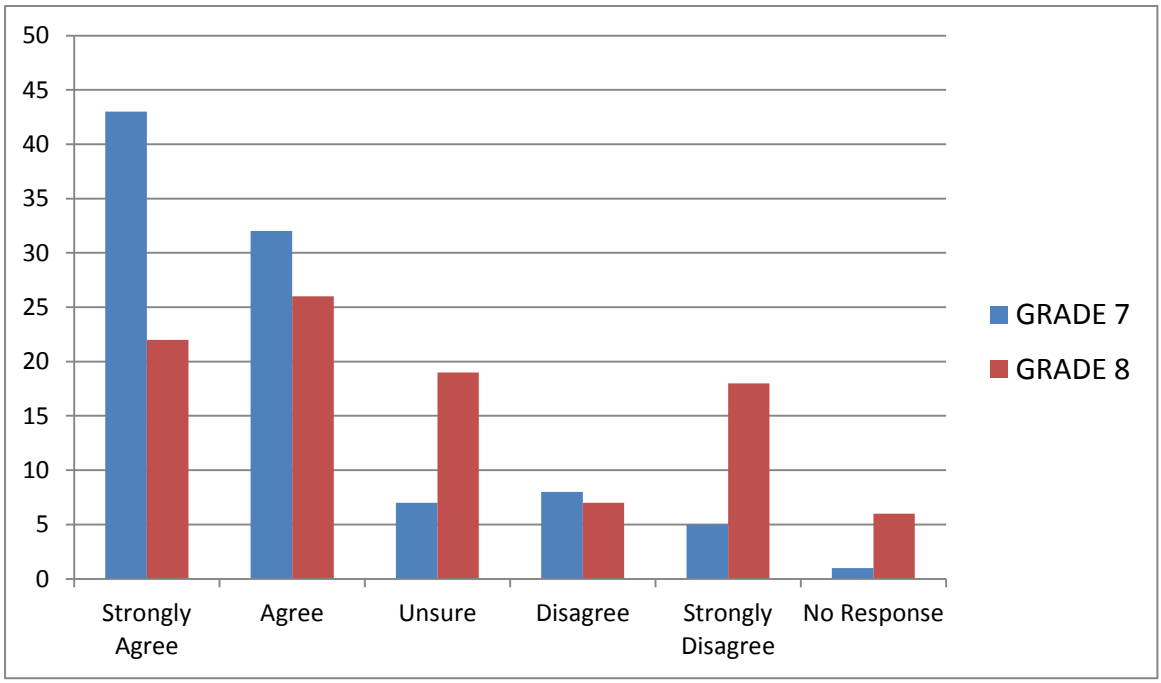

Figure 4.6: Working in groups

The findings as reflected by this graph show that 75% of learners strongly agreed and agreed that they worked in groups in Grade Seven and only 13% disagreed and strongly disagreed to

the same statement. While 7% of learners were unsure of their group work in Grade Seven only 1% did not respond to the same statement.

Responding to how often they worked in groups in Grade Eight compared to Grade Seven 48% learners strongly agreed and agreed that they don't work in groups as often as they did in Grade Seven and 25% of learners disagreed and strongly disagreed, meaning that they work in groups in Grade Eight as often as they did in Grade Seven. The percentage of learners who were unsure as to whether they worked in groups in Grade Eight as often as they did in Grade Seven, was 19%, while 6% did not respond to this statement.

The findings show that group work is more prevalent in Grade Seven (primary school) while it is not a common practice in Grade Eight (high school).

During the focus group interviews learners were asked to describe how they felt about group work in Grade Seven and if they still feel the same about group work in Grade Eight. From learners discussions it was clear that they enjoyed working in groups and stated that they were able to help each other if one did not understand the task that was being done.

FGI 4: L1: The thing that made us happy when we worked in group is that even those who do not know will get to understand as we discuss and remember when writing a test that so and so said that when we were discussing and when you work in groups you are able to share ideas.

FGI 4: L3: Even though they were not smart but they contributed in the discussions they were active and wanted to learn, they were encouraged in groups.

FGI: 5 L3: I liked it because we discussed the things and then we talk about it and it will always be in your mind even when you want to write about it. You don't forget about it even after a long time because you talked about it.

The same was not case when addressing the second part concerning working in groups in Grade Eight. It transpired that most of the time learners do not work in groups in Grade Eight and it was clear that they would have loved to work in groups.

FGI 4: L4: Sometimes but most of the times we do work as individuals
R: How do you feel about that?
FGI 4: L4: Sometimes the work becomes so difficult and you would decide to ask a friend to help you and discuss what has been said or learned in class.

FGI 4: L 2: When you work alone you cannot share your ideas with anyone so you don't have any one to assess what you are thinking or saying whether it's right or wrong or what others think about your idea.

The results of the focus group interviews complement what was revealed by the learner questionnaire on working in groups and addressed this sub-construct as a component of teaching strategies in my conceptual framework.

4.3.7. Learners' experiences of Grade Eight with regard to science learning.

Figure 4.7 presents the composite of four statements made in the questionnaire which were:
We do much more Science in Grade Eight than Grade Seven
Teachers expects us to know lots of Science
We have to write much more in Grade Eight
We have to do more assignments in Grade Eight
The purpose of these statements was to gain the general impression of learners' experience of transition to Grade Eight with regard to science learning.

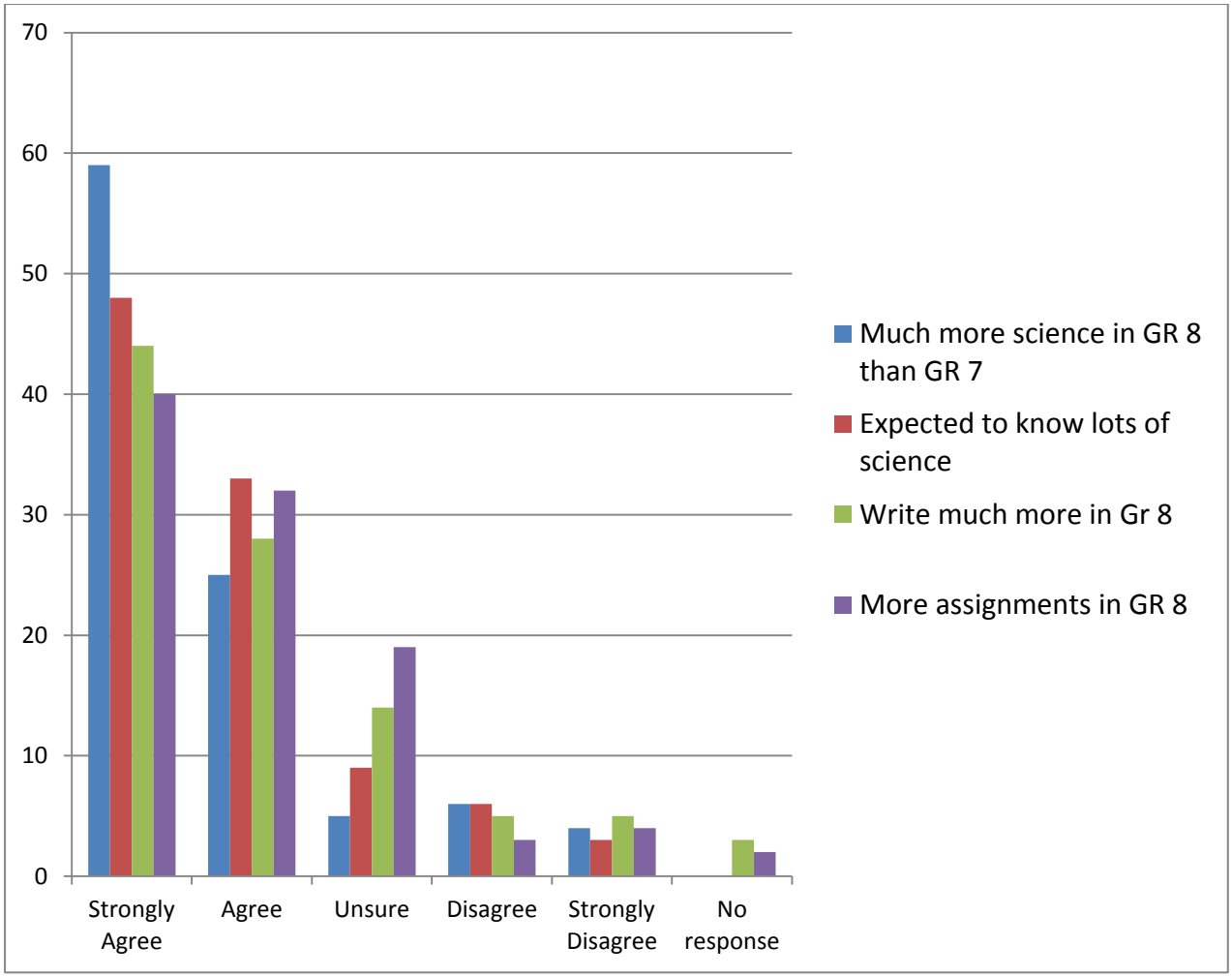

Figure 4.7: Learners experiences of Grade Eight with regard to science learning

Figure 4.7 shows the results of learner responses to the four statements reflected in the graph. The percentage of learners who strongly agreed and agreed that they did much more Science in Grade Eight than in Grade Seven was 84% while only 10% disagreed and strongly disagreed with the statement. There were 5% of learners who were unsure.

In the second statement 81% of learners strongly agreed and agreed that their teachers expected them to know more Science in Grade Eight and 9% disagreed and strongly disagreed to the same statement. The percentage of learners who were unsure was 9%.

The third statement asked learners to respond if they wrote more in Grade Eight and 72% of learners strongly agreed and agreed while 10% of learners disagreed and strongly disagreed. The learners who were unsure if they wrote more in Grade Eight constituted 14% while 3% did not respond to this statement.

To the fourth statement in the graph, learners responded with 72% strongly agreeing and agreeing that they did more assignments and only 6% percent disagreed and strongly disagreed to the same statement. The percentage of learners who were unsure whether they wrote more assignments was 19%. Only 2% of learners did not respond to this statement.

4.3.8. Learners' experiences of Grade Eight with regard to teaching strategies and degree of difficulty of science content

Figure 4.8 presents the composite of three statements made in the questionnaire. These are:

We work from the textbook in Grade 8

My teacher expects us to work more on our own than we did in Grade 7

I find Grade 8 Science difficult

The purpose of these questions was also to obtain a general impression of learners' experience of Grade Eight with regard to Science teaching.

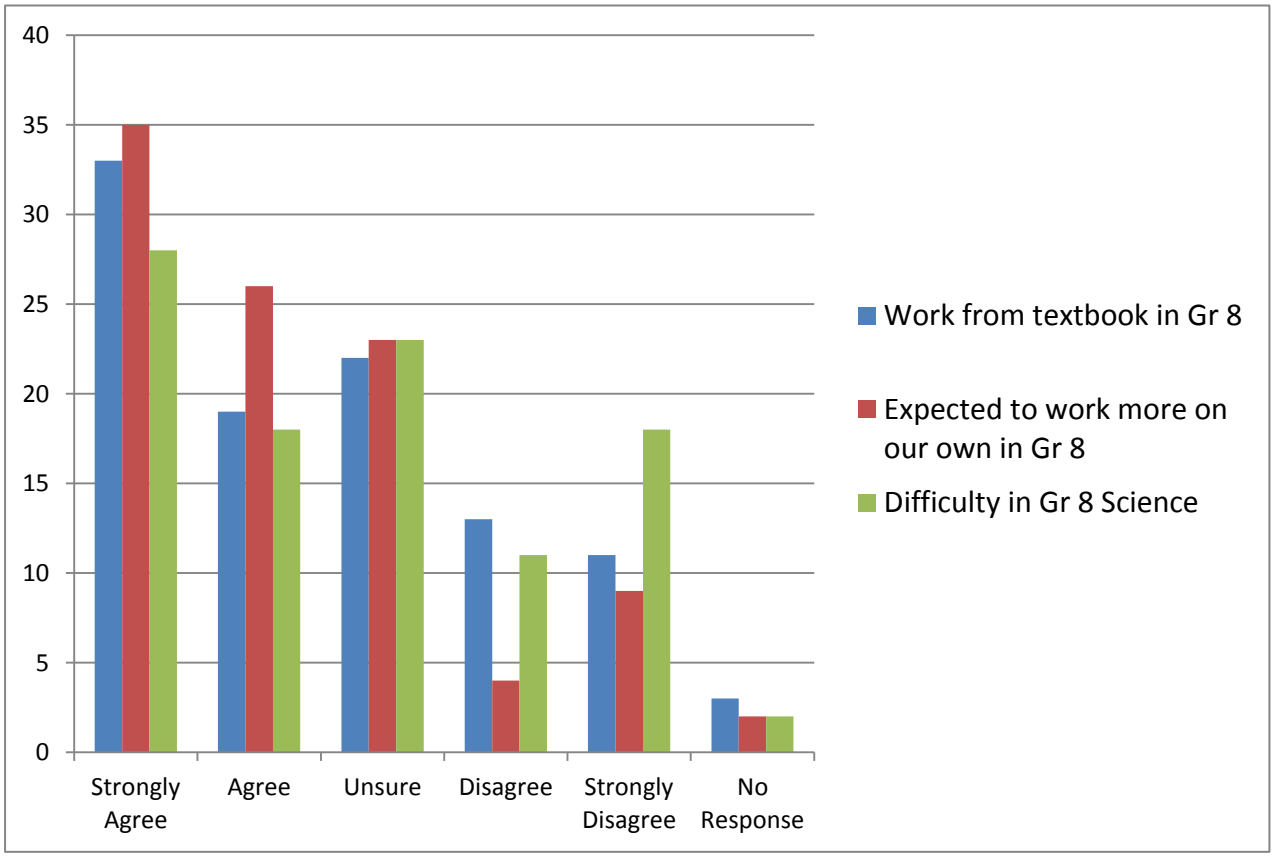

Figure 4.8: Learners experiences of Grade Eight with regard to teaching strategies and degree of difficulty of science content

Figure 4.8 reflects the findings for the three statements above. The percentage of learners who strongly agreed and agreed that they worked from the textbook in Grade Eight constituted 52%, while 24% disagreed and strongly disagreed to the same statement. A response of 22% of learners reflected that they were unsure if they worked from the textbook or not. This response may indicate that learners did not understand what was meant by 'textbook'. Only 3% of the learners did not respond to this statement.

The percentage of learners who strongly agreed and agreed that they are expected to work more on their own in Grade Eight was 61%, while 13% disagreed and strongly disagreed to the same statement. Twenty three (23%) of learners' response showed that they were unsure if they were expected to work more on their own or not. Only 2% did not respond to this statement.

On the statement "I find Science difficult in Grade Eight", 46% of learners strongly agreed and agreed while 29% of learners disagreed and strongly disagreed to this statement and 23% reflected that they were not sure if Science is difficult or not. Only 2% of learners did not respond to this statement.

These findings are supported by what transpired during the focus group interviews where learners voiced that they don't understand Grade Eight Science or find it difficult because of their Grade Eight teachers.

FGI 1: L3: Maam mina ngibuye ngingayizwa science. (Ma'am I sometimes don't understand Science).

FGI 3: L1:Ma'am Yes it's difficult. There are things that I sometimes don't understand when the teacher explains, she explains in a different (strange) way.

R: What do you mean when you say in a different way?

FGI 3: L1:Ma'am it's just that I don't understand her when she explains some other things I understand but others I don't.

FGI 5: L2: Yes Science is difficult in Grade Eight.

R: Does this mean you fail your tests?

FGI 5: L2: No we don't.

R: How do you manage to pass the tests then?

FGI 5: L3: We pass because we just learn what on the notes for the tests.

Learners might be doing well in Science, not because the teachers are using the best teaching methods but only because learners have just decided to rely more on notes than on what teachers say in class. Learners pointed out that the more abstract the concepts become the more difficult Science become for them.

FGI 4: L4: Last term was easy because we were dealing with the life and living where we learnt about things that we can see and are found everywhere and we know them. This term seems to be more difficult because now we talk about the atoms, when we talk about atoms I don't know what are they, where are they and I don't see them every day".

FGI 4: L5: It's difficult this term because molecules you don't see them it would be better if Miss would show us examples of these molecules. The thing that makes Science difficult is examples are not given"
R: What you mean by examples?
FGI 4: L5: I mean real things (she meant the real objects).

The findings presented in Figures 4.7 and 4.8 as well as the interviews reveal that the majority of learners find Science teaching and learning more challenging in Grade Eight. While some of the percentages may appear misleading, this is due to the significant numbers of learners who responded with 'unsure'. For example, with 46% of the learners agreeing that they find Science difficult, this may appear as if the minority find Science difficult. However, only 29% did not find Science difficult. Learners who responded with unsure constitute 23% Out of this 23% there might a certain percentage of learners who find Science difficult or not difficult. This could increase both the percentage of those who find Science difficult as well as those who do not.

4.3.9. Discussion

The majority of learners in this study experienced the transition from Grade Seven to Grade Eight as challenging with the result that they enjoy Science less in high school than in primary school. In the transition from primary school to secondary school they experienced the teachers as quite different to their primary school teachers. One such example also the teaching methods which are quite different. The manner in which they explain is not familiar to grade seven learners as they are used to primary teachers who explain things more slowly and clearly. Primary school science appears to be less formal with more hands-on activities. In Grade Eight they are expected to take notes, do more assignments and have more homework to attend to. Assessment is more formal and learners are expected to work more on their own.

Grade Eight is a step higher than Grade Seven and one would expect the level of work in Grade Eight to be more complex and therefore more challenging than that of Grade Seven. However learners appear to not only experience Grade Eight as demanding, in terms of the amount of work, but also more abstract with regard to the concepts learners are expected to engage with. The question therefore is not whether Grade Eight is more challenging, but whether the transition from Grade Seven to Grade Eight is not too sudden, meaning that learners are expected to change and adapt themselves to the way or manner in which things are done in high school. Learners are finding the leap from primary to high school too big. It needs to be mentioned that the fact that some learners do not experience the challenges of the majority is due to the fact that learners come to high school from different primary schools which may be very different in their approach and ethos. However, this study is concerned with the majority of learners who find the transition from Grade Seven to Grade Eight difficult.

There are findings where there seems to be a large number of differences between learners responses for example, homework, engagement in practical work and assessments. It must be remembered that I collected this data from Grade Eight learners who come from different primary schools where they completed their primary schooling. These findings may indicate that there are teachers who do not implement the policy as required by RNCS. According to the (DoE, RNCS 2002) there are two formal assessment tasks to be performed per term in

Grade Seven. One of these tasks should be a formal test. However there are learners who responded they never wrote tests in Grade Seven.

The findings also revealed that a large number of learners responded with 'unsure'. The learner questionnaire was read and checked for content validity by people who are proficient in English. I did not realise how poor the learners' understanding of English was hence a number of learners may not have understood the question. However this revealed how important triangulation (Cohen et al., 2011) is as I used the focus group interviews to further establish learners' experiences where I was able to speak to learners in person and probe them for further clarifications. During focus group interviews learners were able to express their ideas in IsiZulu. This is a limitation of the study as learners have difficulty understanding English.

4.4 CONCLUSION

In this chapter I discussed the findings that were pertinent to the process skills learners have and how they experience the transition to Grade Eight. A number of skills included as sub-constructs in my conceptual framework were used to determine what grade seven teachers do with regard to teaching these skills and what learners work show with regard to whether they have, in fact, acquired these skills. In order to determine how learners in Grade Eight experience the transition, a number of sub-constructs from my conceptual framework were used to direct my research. These constructs are: teaching strategies, teaching and learning environment and assessment. The findings enabled me to answer my first two research questions. In Chapter Five I will discuss the findings relating to grade eight teachers and their expectations of their learners.

CHAPTER 5

FINDINGS AND DISCUSSION: SCIENCE TEACHING AND LEARNING IN GRADE EIGHT

5.1. INTRODUCTION

Chapter four showed what skills learners in this study have when they enter Grade Eight, providing some insight into the types and level of skills they are taught in Grade Seven. Furthermore a clear picture emerged of how learners experience the transition to from Grade Seven to Grade Eight.

In this chapter I present the findings developed from the analysis of the data collected from the teacher interviews and classroom observations. My findings are informed by the constructs of my conceptual framework. The findings presented in this chapter enabled me to answer my two final research questions. The findings relate to science teaching and learning in Grade Eight within the context of what teachers expect learners to be able to do in Science when they enter Grade Eight and to what extent teachers enable the transition from Grade Seven to Grade Eight.

5.2. GRADE EIGHT TEACHERS' PERCEPTIONS OF LEARNERS' PREPAREDNESS

Teachers were asked in the interview whether they thought learners had the necessary skills to be able cope with grade eight Science when they entered high school. The teachers voiced their views during the interview concerning learner preparedness. During classroom observations I could also note some of their expectations as they presented their lessons.

The findings, based on teachers' responses enabled me to answer my third research question which is: *What are grade eight teachers' perceptions of what learners know with regard to Science when they enter high school?*

5.2.1 Curriculum coverage

The grade eight teachers expected learners to have dealt with a range of science topics. They mention a few from each strand covering Life and Living, Matter and Materials, Energy and Change and Planet Earth and Beyond. During the interviews it transpired that some of the topics that high school teachers expected grade seven learners to have been taught were not covered. When asked to give some examples of the concepts they expect their learners to have learnt in Grade Seven, Miss Hadebe expressed that learners should have covered vertebrates and invertebrates, flowering and non-flowering plants, biodiversity, photosynthesis, states of matter, properties of materials, acids and bases, forms of energy, earth's revolution and rotation. She expected them to know the difference between pure and impure substances. Miss Hadebe was of the view that grade seven learners in general, are not prepared enough to be able to cope with grade eight Science. She blames this on the fact that some parts of Science are taught and others left out in Grade Seven. She mentioned that as grade eight learners come from different primary schools it is clear that some of the work was not done at all, resulting in some learners not developing an understanding of the necessary concepts required, to be able to do grade eight Science. She said:

Uhm….. since the learners come from different schools there are those who are good and there are those which it's clear that some of the work has not been done
and continued:
Yes, basically it depends on the teachers and the method of I personally feel that they are not given the chance to understand the concept ……..

During the lesson observation it was noted that Miss Hadebe expected grade eight learners to be able to provide differences between the terms reflection and transmission of light. This was the first of the three observed lessons. The lesson was introduced by asking questions based on the previous lesson (transmission). Then she introduced the new topic for the day (reflection and transmission of light). She explained reflection of light and then asked learners to explain what the difference between reflection and transmission of light is. The non-responsiveness of the learners was an indication to me that they did not understand Miss Hadebe' explanation.

Miss Hadebe's view of the lesson as explained to me after the lesson was*:*

"My main aim for now is that they understand the meaning of different concepts under light, so that they may not be confused as we move on to more difficult concepts of light."

This comment confirmed what she stated in an interview that she starts from scratch if she feels that learners do not have a back ground on a particular topic.

Miss Thwala indicated that she expected learners to have learnt everything that is scheduled to be learnt in Grade Seven. She mentioned topics in Life and Living such as ecosystems, angiosperms, gymnosperms, vertebrate animals, invertebrate animals, In Matter and Materials the topics mentioned were: properties of matter, different materials, mixtures etc. Miss Thwala was of the view that, because many topics were not covered in Grade Seven, learners were unable to cope with Science in Grade Eight. She said:

maybe we need to consider if we can have some interaction with the people from primary school so that we see if we'll be able assist them that this is what we are expecting, then we see that these are challenges they are actually having.

5.2.2 Rote learning versus understanding

Teachers in Grade Eight described rote learning as an impediment to learner preparedness for grade eight Science. This speaks to the teaching strategies of grade seven teachers.

Miss Hadebe was of the view that in Grade Seven too much drilling is done with little understanding of the concepts resulting in regurgitating of definitions without any real understanding. She felt that learners just memorise the concepts and when the question arises from the very same definition they are unable to provide the answer which is the part of the same definition they have memorised. She was convinced that in Grade Seven much time is spent in memorisation and rote learning rather than understanding. She felt that the majority of learners do not understand the concepts although there are a few who do understand what they are saying or defining. She voiced her opinion on learner preparedness saying:

I don't know for what reasons but another thing is when they come to Grade Eight they are good in recalling rather than understanding….. for instance when you ask them what the definition of photosynthesis, is they can recall that without understanding what it is.
She continued:
…….they are given the opportunity to know and regurgitate everything correctly but they do not have understanding. Most of them do not understand they just cram the work when you break the same definition into parts they just don't understand.

I noted during lesson observations that Miss Hadebe expected grade eight learners to be able to link concepts learnt in class with everyday life. Being able to link what is done in class with everyday life requires a certain level of understanding. This was observed during the lesson (refraction and dispersion of light) as she asked them to *give examples of how a ray of light travels using examples from everyday life.* The emphasis was on the fact that light travels in a straight line. Very few learners were able to give examples, one of which was: *If the corrugated iron roof of a house has a hole in it, the light enters through that hole and travels in a straight line; it does not bend.*

Miss Thwala mentioned that learners in Grade Seven have theoretical knowledge because they are drilled and that conceptual understanding is not a priority. She quoted an example of ecosystems in Life and Living stating that learners can explain what an ecosystem is but when they are taken outside to identify ecosystems they are unable to do so.

So far I have worked with them in life and living and this term we are on matter and materials. At least normally they have got more theory than practical so it seems like they are drilled, it is not like they..... For example when we talk about the ecosystem they cannot give me the examples where would you get it.....

5.2.3. Process Skills

With reference to science process skills that grade eight teachers expect learners from Grade Seven to possess, the interviews revealed that observation, conducting experiments, recording information, hypothesising and predicting, are some of the skills that teachers expect from learners. This is evident in the teachers' account regarding their expectations in terms of skills that grade seven learners possess.

Miss Hadebe mentioned that learners lack basic skills of writing, listening and drawing (communication)

They should be able to write well, observe, listen and because of their age they are not good at listening, they cannot concentrate for long. They should be able to draw; the sketches that they draw are scary because when you ask them to bring back that sketch they will give a sketch from mars.

She indicated that some learners are able to conduct simple investigations and are able to hypothesise and predict what was going to happen.

Some have demonstrated that they are capable of conducting experiments that does not require the use of chemical like we did at the beginning of the year, they themselves did the experiment of autotrophs.

Miss Hadebe's lesson observation two (dispersion and refraction of light) also revealed that in terms of process skills she expected learners to be able to conduct simple investigations. At the end of this lesson she gave them homework as follows:

Investigate how shadows are formed. You can look for information on the internet using your parent's cell phones or any other physical science book that you come across.

The activity above was regarded by Miss Hadebe as an investigation. Conducting investigation involves a series of steps. She is of the view that if learners are doing some research from the text books and internet that this constitutes an investigation. While the (DoE, RNCS, 2002) does include literature research as an example of investigation, it does not constitute an investigation involving hypothesising and prediction.

Miss Thwala was of the idea that learners lack most skills in Science. She mentioned that learners lack observation skills as well as research skills; they are unable to search for information on their own for research projects. She indicated that learners do not possess basic skills which should be developed at primary school level. She gave examples:

I've discovered that they are lacking most skills in Science; for example the skills that are expected in learners are maybe skills like to observe to be able to make some recording of the information.

And

The listening skills and the writing skills all those skills they go together with more especially the research part so our learners seem to lack on how to conduct a research like how to look for information on their own.

Miss Thwala conceded that language was a problem and that learners perhaps knew more than they could express in writing.

I think that learners are unable to communicate and do not have ability to show what they actually know……it's just they are lacking to show who they are and what information they have. It's not easy for them to show the knowledge and skills they have so you need to dig so that you are able to see where they are lacking actually.

It was noted that the skills grade eight teachers mentioned included complex skills such as aspects of investigations e.g. hypothesising and predicting, but no mention was made of skills such as classifying and comparing which were emphasised in Grade Seven.

5.2.4. The teaching and learning environment

My findings in chapter four indicated that learners' experienced the teaching and learning environment in Grade Eight as quite different to that in Grade Seven. The sub-constructs focussed on were the teachers' attitude, the focus on homework, working in groups, as well as the amount of work covered. All these contributed to learners experiencing the classroom environment in Grade Eight very differently.

During classroom observations the physical nature of the classrooms was observed in terms of classroom displays and seating arrangements. In both grade eight classrooms where I observed the teachers and learners interacting, there were no displays on the walls in the form of charts. At Amanzamhlophe High School learners were seated in two's and others in three's on two-seater desks. In this school overcrowding was noted in grade eight classes. Miss Thwala teaches at Amanzamhlophe High School. At Zamelisizwe High School learners were

[1]all seated two at a desk. Miss Hadebe teaches at Zamelisizwe High school. In both schools the desks were arranged in four rows with the teacher's table in front facing the door. This seating arrangement provided evidence that in High schools group work is not promoted as much as it is promoted in primary schools. In almost all lessons teachers stood in front of the class and explained the concepts for the day.

Miss Hadebe was of the idea that grade seven learners entering Grade Eight are lacking attentiveness and are ill-disciplined when it comes to doing their school work. During classroom observation I noted that learners were disruptive during lesson delivery. I also noted that when Miss Hadebe walked around the class checking completed homework there was quite a number of learners who did not complete tasks. Miss Hadebe had a strategy to discipline disruptive learners; she would call them to come and kneel in front of the class for the duration of the lesson. Then the punished learner will only go back to his/her seat when it was time to do a classwork activity. That strategy reduced a number of learners who were disruptive in class.

Miss Thwala mentioned during the interview session that learners are lazy and do not complete the classwork tasks and come back the next day to school with work still incomplete. She blames this on the banishment of corporal punishment. During classroom observation I noted that this grade eight class was the most distracted class. Some of the learners were talking while Miss Thwala was teaching and not paying attention at all. Miss Thwala seemed not to care but continued with those who were listening. During the focus group interview there was an interesting response from one of the groups of learners who stated that she did not enjoy grade eight sciences because other learners make too much noise during lessons and that disturbs them while trying to concentrate. This statement was confirmed by Miss Hadebe's response when she mentioned the fact that learners are ill-disciplined as well as my own observation of learners talking in class while the teacher was teaching.

In all three observed lessons learners were not expected to work in groups, they worked independently. Teachers stood in front of the class and explained the concepts. The teaching of Science in Grade Eight appeared to be very formal compared to Grade Seven. The

[1] Amanzamhlophe and Zamelisizwe

classroom observations confirmed what transpired during the focus group interviews that in high schools learners work individually most of the time as working in groups is not promoted.

Although Miss Thwala mentioned that learners were lazy, she did admit that they come to Grade Eight with curiosity about natural phenomena and thought that this curiosity could most probably be channelled into creative and constructive activities.
Learners in primary school are more curious -may be if you trigger them to be able to think creatively and constructively....
However, she did not elaborate how this could be achieved.

5.2.5 Discussion

Teachers in Grade Eight expect learners to have learnt all concepts in their curriculum. This is correctly so as in South Africa our curriculum is a spiral curriculum where new knowledge is built on the foundations of the previous concepts learnt in the previous grades. Where there seems to be gaps in knowledge, teachers are forced to start afresh and build on that foundational knowledge. However, the reality is that learners come from different primary schools where it appears that different topics are taught. The fact that learners are confronted with new topics in Grade Eight that are expected to have some knowledge of and often do not, could have an impact on their experience of Science in Grade Eight.

The (DoE, RNCS 2002) promotes learners centred education and places emphasis on inquiry-based learning. Grade eight teachers are of the view that learners come from primary school only able to rote learn with little ability to ask testable questions. This appears to be the case, However, there was little evidence to suggest that grade eight teachers teach any differently.

Grade eight teachers focus on different process skills to those promoted by the grade seven teachers in the study. Both teachers mention learners' lack of research skill and see this as an inability to conduct investigation. This speaks to grade eight teachers poor understanding of what exactly is meant by an investigation within the context of the development of process skills. To develop the necessary process skills to enable them to conduct experiments, learners should engage in hands-on activities.

Grade eight teachers find learners ill-disciplined and lazy. They do not consider the fact that the nature of the classroom in Grade Eight may be quite different to that of Grade Seven and that learners perhaps find the more formal environment intimidating. There may be a number of reasons for learners' poor behaviour that teachers may need to investigate.

5.3 MANAGING TRANSITION

Teachers can play a very important role in helping learners to cope with the transition from primary school to high school within the context of learning Science. They can help learners in many ways by being supportive and approachable. Their attitudes towards learners during transition will contribute to the way in which learners experience learning Science in Grade Eight. In this section I report on my findings with regard to how teachers influence this important transition for learners. These findings enabled me to answer my fourth research question: *How do grade eight teachers manage learners' transition from primary to high school in science classrooms?* In answering this question I will again draw on my conceptual framework to organise the data according to the constructs of the framework.

5.3.1. Conceptual development

Linking concepts learned in the previous grades with the current concepts learnt is important. This helps learners to see connectedness between concepts learnt in the different grades. Progression and continuity is a very important aspect of the RNCS curriculum; linking the concepts ensures continuity in the curriculum. Grade eight teachers, when asked during the interviews if they link primary science to science learnt in Grade Eight to enable learners see connections, they replied as follows:

Miss Hadebe stated that she did not have much knowledge of what is done in Grade Seven but capitalises on learners' prior knowledge in order to integrate new concepts with prior knowledge. Miss Habede: "*As I said earlier on I really don't have an idea what's going on there at primaries but I capitalize in their knowledge and try to integrate."*

Miss Thwala stated that learners come from different primary schools and not having met with primary school teachers, she was not aware of what the different learners knew when they arrived in Grade Eight. She further mentioned though that she used activities to

diagnose the level of understanding the learners are at. From the these diagnostic activities she was then able to link the concepts done in Grade Seven with those done in Grade Eight.

*Miss Thwala: "It's a pity that when (*this is a good question*) you go there with the work schedule.....to get the background. These learners are coming from different primary schools and I haven't met those teachers from primary school to know what those learners know so it's a matter of the activities that I give to learners. They are the ones that make me to be able to diagnose the level of understanding for these learners so this how I can identify whether there is a link or not…."*

This is a concern because according to the (DoE, RNCS, 2002) planning occurs at three different levels. Phase planning comprising of three grades (7, 8 &9) in the senior phase. At this level planning is very broad with a mere listing of topics that should be covered in each grade within the phase. Work schedule planning then amplifies which specific topics are to be covered in a particular grade. As the third level, lesson planning should indicate exactly what is to be taught in a particular grade. The teachers' responses reveal that teachers in Grade Eight do not involve themselves in phase planning so as to have an idea about the Science learnt at primary school.

Part of Miss Thwala's response also reveals that she also did not have a clear idea of phase planning. If she was involved in phase planning, she would not need to meet with primary school teachers in order to be able to link the sciences learnt in these two grades because she would have been in consultation with the RNCS policy document for Science to gain understanding of what should be taught in Grade Seven..

During the interview with Miss Hadebe she mentioned that in some instances it becomes very clear that grade eight learners have no background knowledge of a certain concepts. This reveals that there are gaps regarding concepts learnt in Grade Seven. This research study wanted to gain information as to what strategies teachers use to bridge the gap between what learners know and what they should know. In helping the grade eight learners develop the concepts they missed in Grade Seven, Miss Hadebe stated that before she started her lessons she always did baseline assessment which helped her identify if learners were familiar with the topic to be dealt with. She stated:

I don't have much knowledge of what is being done there in Grade Seven but I capitalise on their knowledge and try and integrate…..they can recall, like they can recall the names of chemicals they used, the chemicals that they are familiar with they can use to create compounds.

She further mentioned that she reintroduced topics from scratch to accommodate those learners who did not deal with the topic in Grade Seven. During these class observations I noted that in one of the three lessons observed, Miss Hadebe did go back to explain the difference between reflection and transmission of light as to cater for learners who did not know anything about these concepts. Miss Hadebe resorts to starting afresh in order to bridge the gap and accommodate those learners who did not cover that particular concept. However starting afresh may benefit some learners but also bore those learners who studied the topic in Grade Seven.

Miss Thwala stated that she ensured that new knowledge and concepts were explained using real objects and real life situations allowing learners to relate this knowledge to their daily lives. She further mentioned that she used code switching where possible, when explaining new concepts ensuring that all learners understand the concepts that are introduced. She explained:

like when I talk of H_2O they must know that water is the combination of the hydrogen and oxygen and how is hydrogen formed and how is oxygen formed so if you take it on that the examples where they look at ice as ice and water as water....

She also expressed that sometimes she was hampered by challenges beyond her control such as the lack of resources and support from the School Management Team (SMT). I noted during class observation that she code switched as she explained and provided isiZulu words for certain concepts. She further stated that:

So at least you explain it in the real life for example when I was talking to them about *elements so that we are able to translate these elements into iSiZulu words for instance sulphur – isibalule.....So they know that when we talk of science it's in our daily lives it's not something that is in the school in the classroom but it's all about what we live.*

5.3.2. Process Skills development

Process skills are the key factors when considering the processes of Science and in this context they are key to interpreting how practical work in Science is conducted. Therefore promoting process skills indirectly influence learner involvement in practical work. Practical work is the cornerstone of science teaching and learning, hence the inclusion of process skills in my conceptual framework. This enabled me to understand how these skills were developed in Grade Seven and how teachers enable the further development in Grade Eight. Learners need to be able to engage meaningfully in practical activities for science practical work to be effective. Effective practical work refers to *any* type of science teaching and learning activity in which learners are involved in manipulating and/or observing real objects and materials (e.g. determining magnetic and non-magnetic objects, carrying out acids and bases tests) working individually or in small groups (Millar, 2011).

Grade eight teachers articulated their views during interview sessions regarding skills they expected grade seven learners to possess. They clearly expressed that grade seven learners do not have the required skills. Classroom observations served to inform me whether teachers did indeed promote the use and development of process skills.

While the process skills observation, classification, comparing, experimentation and communication were the focus in Grade Seven, I decided to focus on the following skills in the grade eight classrooms: observation, comparing, recording results, hypothesising, prediction and 'what if' questions. The reason for this choice was the fact that observation and comparing are the skills that are required in all areas of Natural Sciences and should therefore receive attention in Grade Eight as well, while hypothesising, prediction and the ability to ask questions about science phenomena pertain to experimentation and these skills should be expanded on in Grade Eight.

Miss Hadebe's lessons revealed that she seldom promoted the use and development of observation skills and investigations. Only in one of the three observed lessons were learners asked to complete an activity where they were to observe and note the differences between the diagrams of biconvex and biconcave lenses. In the lesson on refraction and dispersion of light an effort was made to develop investigation skills as learners were required to investigate how shadows are formed. There were no attempts in any of the lessons to promote

the development of hypothesising. I also observed that learners were not encouraged to predict or ask ‘what if’ questions. Learners did not ask any questions whatsoever and none of the activities required them to do so.

Miss Thwala’s lessons revealed that to some extent she does promote the use and development of process skills. During the interview Miss Thwala said that her learners engaged in hands-on science activities. This was observed to a very limited extent during a demonstration lesson where learners were involved in the demonstration, handling some equipment and helping the teacher. During the demonstration she asked learners to observe carefully and note the difference before the sulphur was burnt and after burning it. She instructed learners to record their results in a table. Learners were neither expected to hypothesise during these lesson observations nor were they expected and encouraged to predict or ask ‘what if’ questions.

Learner workbooks gave evidence of an activity that required learners to make use of five cent coins and cardboard to construct shells of electron configurations. Learners were expected to apply the theory of electron configuration to make models showing how electrons of an element are arranged. Another activity from the workbook required learners to investigate the caring for plants and animals and then design a poster. Instructions given were:

- draw a plant or an animal of their choice
- Say how their chosen plant or animal should be treated.
- Mention the importance for caring for the plant or animal
- Then they were required to write down a slogan for their poster.

It transpired from these observations that teachers mostly encourage and promote the development of basic process skills such as observing, comparing and recording results. However, Miss Hadebe in one of her lessons she did ask learners to do investigative research. However, this did not constitute a hands-on activity. Learners’ workbooks revealed attempts to promote investigation skills by Miss Thwala. Development of integrated process skills such as hypothesising and predicting, was not evident. It was further observed that teachers do not pose open-ended questions which require learners to think.

It is interesting to note that during interviews when grade eight teachers were asked if learners are able to engage meaningfully in practical activities when they enter Grade Eight, they responded positively. This is in contradiction with the fact that they earlier said learners lack most basic skills. They said they lacked certain skills but Miss Hadebe said she thought they could conduct simple investigations. She mentioned that learners were able to follow instructions to conduct an investigation to see what happens when a green plant is placed inside a box with an opening to let in the sunlight. This activity was the done and learners' workbooks prove that, but it was not used to develop skills such as raising investigable questions, hypothesising and prediction as these skills were not evident in their experiment write up. This activity could have been used effectively in developing these skills. Conclusions were made by making the diagram before the plant was placed in the box and after, which showed the plant changing the direction towards the hole that brought the light.

5.3.3. Teaching strategies

The findings of this study revealed that science classrooms are still dominated by teacher-centred strategies. The methods of teaching employed by teachers in this study revolved more around the teacher than the learners. There was little or no activity on the side of the learners in terms of being full participants in learning programmes. Much time was spent by the teacher explaining concepts. Teachers relied more on the talk and chalk method of teaching.

Miss Hadebe used the textbook method; she read from the book and then explained. She did not make any attempts to make her observed lessons practical in any manner. She explained, wrote some notes and gave learners an activity to complete. She did not bring any resources or teaching aids to class. During the class observations the use of a practical work approach was not evident at all except for investigative literature research given as homework. Miss Thwala tried to make her lessons practical; she used role modelling involving learners in the lesson, for example she made learners stand in front of the class in couples and singles to symbolise atoms and molecules. She also used demonstration to conduct an experiment to show properties of oxygen when she burnt sulphur.

Neither of the teachers encouraged learners to work in groups in any manner. Co-operative learning was not evident in any lessons observed for this study. Learners worked independently most of the time copying notes from the chalkboard and completing activities

in comparison to what grade eight learners confirmed about their involvement in group work in Grade Seven. It is evident that indeed the teaching strategies used at primary schools are different to those used in high schools.

As 'what if' questions were mentioned as an aspect of developing predictive skills, I also focused on the types of questions teachers asked learners. Miss Hadebe did not ask any open ended question during all three of her lesson presentations. Miss Thwala did not ask any open ended questions during the presentation of the three lessons I observed. The questions that she asked were all closed. These were asked in the introductory part of the lesson. She asked questions such as: *What is an atom? and What is an element?*

Drawing from the lessons observed and learners' responses during FGI I am inclined to say that active learner involvement in practical work is limited, and group work (cooperative) is not practised in Grade Eight. Traditional strategies are still prominent in their teaching.

Observing Miss Thwala's lessons revealed that she did not do remedial work for all the activities including homework. The only remedial work evidenced was the classwork activity that was done and completed in class during the observation. Learners workbooks did not reflect any homework activities being remediated. This was the activity that required learners to use their imagination. The activity – The particle model of matter: *Imagine and draw what you think you could see inside the ice, water, and water vapour if you had magnifying eyes which could make things bigger.*

Learners drew what they imagined on their worksheets and then they provided answers which were filled in on a table drawn on the chalkboard. However with this activity to me it seemed as if this was not the first time they did it. What they imagined was exactly what the teacher required. In comparison with grade eight learners' workbooks, teachers in grade seven took time to do remedial/ corrections of the classwork and homework given.

5.3.4. The teaching and learning environment

This construct refers to the kind of environment that the teacher creates in the classroom. Therefore the sub-construct teacher attitude is imperative in creating this environment. The sub-construct teacher attitudes have a direct bearing on learners. Teachers in Grade Eight

appeared to be understanding towards their learners. Miss Hadebe's class was the most formal class, as she always stood in front explaining. She created a learning environment that did not allow active participation of learners. She seemed very strict, such that learners were afraid of her for apparent reasons. She could not be accessible as learners were afraid of her and did not ask for clarity if they did not understand something.

Miss Thwala's class was a bit chaotic. She seemed accessible because learners could talk to her freely without any reservations. The learning environment she created in her class was informal. She was not too strict and tried to involve learners in some of her lessons. Learners were not entirely passive.

As mentioned above, grade eight teachers spent most of the time explaining concepts and as a result the time for classwork activities became very limited. Learners had to finish their classwork activities at home and were given home work on top of the unfinished classwork. Miss Hadebe spent most of the time explaining concepts and in all her lessons learners did not finish the classwork. She asked learners to complete it at home or during their spare time. On the following day she checked if the work had been completed and then recapped what was done the previous day through questions and answers. She would then start with a new lesson. She did not do remedial work on the classwork and homework activities.

Grade eight teachers assumed traditional roles of teaching by explaining concepts with less interaction with learners. Their explanations were not always up to standard that one would expect from a grade eight teacher. In some instances they would explain and then ask questions only to find that learners would sit quietly giving no response. I took that as evidence of not understanding what was being explained. For example Miss Hadebe explained the concepts *reflection and transmission,* thereafter asked for the differences between the two concepts. Learners just sat quietly and said nothing. Grade eight teachers explained for a long time without asking questions during their presentations to ensure if learners were following. This was confirmed by learners who said:

L1: Coz the teacher can't explain that much as the grade 7 teacher used to explain so I don't understand her.
L2: Maybe if she could explain and show us something that would make us understand. Ma'am is not used to showing us things she just explains.

Classroom setting as the sub-construct is also very important in helping learners to settle well in their new learning environment. As I had time with grade seven teachers in their classrooms for completing the questionnaires I was able to view their classrooms. Classrooms were very clean with charts on the wall and some of the charts noted were particularly for Natural Sciences: water cycle, vertebrates and invertebrates, acids and bases, plants, structure of the flower etc. Some of the learners work was displayed on the walls. Grade eight classrooms were bare, with no charts at all on the walls. No learner work was displayed.

5.3.5 Discussion

The grade eight teachers in this study are aware of the differences between Grade Seven and Grade Eight and are of the view that grade seven learners come to Grade Eight largely underprepared for Grade Eight in the context of learning Science.

With regard to concepts, grade eight teachers are of the view that learners are not sufficiently prepared for learning Science in Grade Eight. They are inclined to blame grade seven teachers for not providing the necessary foundation for learning Science in Grade Eight. There was evidence that grade eight teachers attempt to bridge the gap by linking the Science learned in Grade Eight to their everyday lives or by teaching concepts learners were expected to acquire in Grade Seven. In this manner they attempted to ensure that learners understood the concepts learned. However, the fact that grade eight teachers have no idea what is taught in Grade Seven and how it is taught makes it very difficult to ease the transition for learners to Grade Eight.

The (DoE, RNCS, 2002) promotes and supports an activity-based, learner-centred approach to teaching, thus making the inquiry based learning a corner stone in Science Education. In practical terms this means that learners need to acquire essential process skills. Grade eight teachers lamented the fact that learners come from primary skills with poor basic skills and mention a number of complex skills they expect learners to acquire. In actual fact classroom observation show that grade eight teachers do very little to develop more complex skills and have a poor understanding of what an investigation entails.

While grade seven teachers appear to apply a more learner-centred approach, grade eight teachers seemed to rely more on traditional approaches to teaching rather than learner centeredness. In spite of grade eight teachers' mention of the necessity of acquiring complex

process skills, there was no evidence of real hands-on activities in the grade eight classes. This most probably accounts for learners' view that learning Science in Grade Seven was more enjoyable than in Grade Eight.

The informal and learner-centred approach in Grade Seven may be the reason not all topics in the curriculum are covered. Added to this, is the fact that grade seven teachers spend more time explaining concepts to learners (according to learners).In contrast to this, grade eight teachers cover all topics required by the curriculum, but have less time to recap on work covered and expect learners to complete all unfinished work at home. All of this translates into an atmosphere that is quite different to the grade seven environment. Teachers do not appear to consider the magnitude of this change for learners and the possible effect on their experience of Science.

5.4 CONCLUSION

In this chapter I discussed the findings that related to grade eight teachers 'perceptions regarding learner preparedness for grade eight Science and the manner in which they manage the transition from Grade Seven to Grade Eight. Teachers have a number of perceptions of what they think learners should be able to know and do in Science, when they reach Grade Eight. A number of constructs drawn from my conceptual framework were used to determine how teachers manage the transition from Grade Seven to Grade Eight within the context of teaching and learning Science.

In Chapter Six I will discuss my conclusions based on my findings and draw from the relevant literature to support my conclusions. I will also make recommendations based on the findings of the study.

CHAPTER SIX

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

6.1. INTRODUCTION

This study explored how learners negotiate the transition from primary school to high school with regard to the teaching and learning of Science. In chapter four and chapter five I presented the findings based on the analysis of the data collected using different data collection instruments in an attempt to answer my research questions. In this chapter I present a final discussion and conclusion as to why the learners in this study experienced the transition in a manner in which they did. I also make a number of recommendations to ease the transition from Grade Seven to Grade Eight, within the context of teaching and learning Science.

6.2. SUMMARY OF FINDINGS

In an attempt to answer my research questions, various sources of data were used in order to develop a better understanding of the experiences that grade seven learners encounter with the transition to grade eight in terms of learning Science. This study was framed by my conceptual framework which I used as a guide to collect and interpret the data. A number of constructs and sub-constructs informed the data collected by questionnaires, interviews, focus group interviews, classroom observations as well as document analysis of learners' workbooks and assessments books, teachers work schedules and lesson plans. The constructs and sub-constructs enabled me to answer the following research questions:

(1) What science skills do learners acquire in Grade Seven?

(2) How do learners experience the transition from primary to high school with regard to science learning?

(3) What are grade eight teachers' perceptions of what learners know with regard to Science when they enter high school?

(4) How do grade eight teachers manage learners' transition from primary to high school in science classrooms?

6.2.1. Skills acquired in Grade Seven.

Grade seven teachers' responses were all positive and provided examples as to how they facilitate the development of the science process skills. The skills that they say grade seven learners acquire are observation, classification, comparison, measurement, communication, experimentation. However what teachers say did not tally with what was revealed by learners work books and assessment books. Teachers said they facilitate these skills but learners' books showed only a few of the skills were actually engaged with.

Learners' workbooks revealed that learners struggled with some of these skills with the exception of observation, classification and comparison. The findings revealed that observation was the most used process skill as confirmed by the literature (Letsholo & Yandila, 2002), followed by the skill of classification and comparing. The findings reveal that learners are not afforded opportunities to practice measurement skills widely. Teachers focused on simple skills and neglected the integrated skills such as experimentation and communication. According to the (DoE, RNCS, 2002) experimentation involves learners in carrying out different steps to conduct experiments. Although teachers said their learners acquired experimentation skills there was no evidence in learners' workbooks where learners were required to use these steps to conduct an experiment.

Furthermore, learners experienced problems in communicating their observations in different ways, particularly in the written form. They could not draw conclusions. Learners struggled with language. This could be expected as the language of teaching and learning (LOLT) in the schools involved in this study is English. LOLT poses a huge problem in our schools. Learners may understand what is being taught or demonstrated but when they are expected to express that in writing or verbally, they are unable to do so. Since LOLT is English in the Intermediate and Senior Phases, learners are expected to be able to express themselves in English. I am of the view that acquisition of communication skills can be hindered by the fact that learners have to express science information in a language that is not their own. These findings are similar to the study by Rambunda and Fraser (2004).

This study reveals that grade seven learners' exposure to process skills is limited to basic process skills which in turn limit the acquisition of more complex process skills.

6.2.2. Experiencing the transition from primary to high school with regard to science learning.

The findings revealed that a majority of learners experienced transition as challenging. Enjoyment of science in Grade Eight declined in most learners, compared to the enjoyment of science in Grade Seven. This finding is in line with other findings that concluded that students' interest and enjoyment in science drastically declines during secondary schooling (Baird, 1994; Peloagae, 2009; Speering & Rennie, 1996). This decline in enjoyment of science may be associated with a variety of factors.

Teaching strategies

Teaching strategies used by grade eight teachers contributed to the transition challenges that grade eight learners face with regard to learning Science. The first aspect of transition that had an impact on learners' transition with regard to science learning is group work. As mentioned in chapter five in this study, group work refers to co-operative learning. Johnson and Johnson (2009) they are of the view that learners learn better in small cooperative groups, where they help each other to realise a common goal. Grade eight learners were clearly unhappy that they always had to work individually. They expressed their disappointment with the fact that they were working individually rather than in groups. They regarded groups as the platform where they get a chance to discuss concepts and get help and better explanation from others in the group if they did not understand the teacher. Johnson and Johnson's (1994) findings suggest that learners achieve more in cooperative interaction than in competitive or individualistic interaction. The findings of this study support their findings.

The lack of practical work in Grade Eight resulted in learners not enjoying Science as they did in primary schools where their teachers would take them outside the classroom to learn certain aspects of Natural Science. This finding confirms those of Braund and Driver (2005). However, Braund and Driver's study also found that, while learners enjoyed practical science at primary school and value it as a method of learning Science, they looked forward to doing more science in high school with more bigger and better equipment. The learners in this study showed no inclination to engage with science equipment.

The lack of practical work in Grade Eight did not only cause the decline in enjoyment of science but made learners experience Natural Sciences as a difficult learning area as they

expected that new concepts would be explained using real objects. Instead, learners worked more from the textbooks and were taking notes from the chalkboard most of the time and listening to teachers' explanations. This finding is in line with that of Paloege and Gaigher (2010) which revealed that learners moving form GET band to FET band were disappointed in the teaching strategies used by FET teachers, particularly the fact that practical work was not often done in high school. This finding matches the finding in my study except for the fact that my results are for the transition from the same phase (Grade Seven to Grade Eight) but in different environments, as Grade Seven in this study is in primary school and Grade Eight in high school. High school and primary school environments are different.

Assessment

Tests and assignments are classified as pen and paper tasks and are more prevalent in high schools (Boaler, William & Zevenbergen, 2000). Relying on this form of assessment may disadvantage certain learners and is not in line with the RNCS. According to the (DoE, RNCS, 2002) assessment should be an ongoing, continuous process that uses a variety of strategies satisfying a variety of learner needs. The findings of this study reveal that learners in Grade Eight write more tests, reducing the opportunity for learners to demonstrate their knowledge and skills in different ways and thus contributing to a decline in the enjoyment of Science in Grade Eight.

Teaching and learning environments

The teaching and learning environment is an important aspect of transition (Midgley et al. 1991). Teaching and learning happen within the context of the classroom. For teaching and learning to be effective teachers need to ensure conducive learning and teaching environments (Komle, 2009). The results of this study revealed that teaching and learning environments also had an impact in learners' experiences of transition. Grade eight classrooms were very different to grade seven classrooms in terms of displays, discipline and teacher approachability. One aspect that was also significantly different was the amount of homework. While learners were given more or less the same amount of homework as in Grade Seven, the fact that they always had to complete unfinished work, is an indication that the pace changed too suddenly in Grade Eight.

The difference in seating arrangement as well as the teachers' perceived attitude towards learners were also very different and this led to learners experiencing the grade eight

classroom as very different to the grade seven classroom. Moreover the level of formal thinking in grade eight learners would differ as some would still be operating in the concrete stage. During focus group interviews learners expressed that they needed their teachers to use concrete objects for them to understand better.

6.2.3. Teachers' perceptions of what learners know with regard to Science when they enter high school.

Grade eight teachers' perceptions regarding what Science learners know when they enter high school were more or less similar. They both expected grade seven teachers to have covered all the topics that are to be covered in Grade Seven. The findings of this study revealed that teachers are concerned by the curriculum coverage. They indicated that there are topics which are not covered in Grade Seven. This gap in knowledge had a bearing on learners' science conceptual development. However this could be expected as we know the RNCS did not have clear demarcation as to which topics should be covered in which grade within the Senior Phase with regard to core knowledge and concepts. Therefore, as Grade Eight in this study is composed of grade seven learners from different schools, it is possible that different topics were not covered by these different schools.

The emphasis on national tests on content knowledge may contribute to Science being frequently taught in the two final years of primary school (Murphy, 2006). In the absence of such tests, teachers often neglect to teach topics they dislike or know little about. A study by Ngubane (2014) with grade four teachers found that they did not teach the matter and materials strand as they found it difficult and did not understand it. Furthermore, Ponchaud (2001) claims that teachers often feel the necessity to prepare learners for tests by ensuring the learners can recall the required content knowledge. This is most probably the case for this study too, as teachers perceived that their learners were good at recalling information without any understanding. Grade eight teachers are of the view that grade seven learners are drilled into memorising the information without necessarily understanding the concepts. However, classroom observation revealed that grade eight teachers were inclined to do the same.

This study also revealed that grade eight learners lack basic skills such as listening, writing and research skills (being able to look and extract information). According to Padilla (1990) *"the basic (simpler) process skills provide a foundation for learning the integrated (more*

complex) skills" (p.1). Grade eight teachers expected their learners to be able to conduct investigations, hypothesise and predict. They expected learners to be able to perform integrated science process skills. These skills are developed and built upon basic science skills. Learners cannot be expected to conduct investigations effectively if they have not acquired the most basic science process skills. Padilla (1990) further states that "*we cannot expect students to excel at skills they have not experienced or been allowed to practice* (p.3). As my finding revealed that grade seven teachers mainly concentrated on developing skills such as observation, comparison and classification which are basic science process skills. Learners therefore would be incompetent in performing integrated skills as was expected by grade eight teachers. It is not clear whether the lack of understanding of science integrated skills in teachers themselves influenced them not to provide learners with opportunities to develop these skills. It was evident in the learners' workbooks that they did not provide opportunities for learners to acquire more complex skills either, in spite of them professing to do so.

Grade eight teachers are of the view that their learners are ill-disciplined and not committed to their work. Learners were not completing homework and classwork activities. This finding confirms what other studies have revealed including Midgley et.al (1991) that learners experienced significant changes in the classroom environment as a result of the transition and that these changes were likely to result in less positive attitudes towards academic activities. This is viewed as a lack of discipline in high school classes.

6.2.4 Managing learners' transition from primary to high school science classrooms

Teachers in Grade Eight need to be able to manage the transition in order for learners to adapt well in grade eight science classes. They play an important role to help learners negotiate the transition from grade seven to grade eight Science. Braund and Driver (2005) are of the view that the process of 'bridging' which entails *harmonising pedagogy'* (p.79) between primary and high schools, is essential to ensure continuity.

One of the major issues mentioned above is the grade eight teachers' views of the gaps in learners' knowledge and my contention that this is due to lack of direction provided by the RNCS policy document for Natural Sciences. Both teachers in this study described ways in

which they try to bridge the gap in an effort to smooth the transition between grade seven and grade eight Science. I am of the view that in order for teachers to be able to link grade seven Science with grade eight Science it is of utmost importance that they know what Science is learnt in Grade Seven. This study revealed that even though grade eight teachers make attempts to bridge the gap in science conceptual development they do that in a superficial manner as they themselves do not have an idea of what is being taught in primary school. Progression and continuity are key design principles in the RNCS curriculum and therefore it is imperative that teachers are well informed with what is taking place in the lower grades (DoE, RNCS, 2002). While Braund and Driver (2005) recommend that teachers should take cognisance of progression and provide continuous experiences around investigative tasks that build on knowledge that learners bring to Grade Eight, there was little evidence of this in the grade eight teachers' approaches.

Many studies have reported negatively on teacher–learner relationships in post-transition contexts (Attard, 2010, Speering & Rennie, 1996, Zeedyk et.al 2003). According to Attard (2010) learner–teacher relationship experienced by learners changed dramatically as the learners made the transition to secondary school. Teacher attitudes towards learners on transition are important. Learners in this study praised the wonderful relationships they had with their grade seven teachers and assigned their enjoyment of Science to it. While grade eight learners did not mention any negative attitudes displayed by their grade eight teachers they neither praised their relationship to their new high school teachers. However one learner during the focus group interview did say she was afraid of her grade eight teacher, but could not state the reason even after much probing. She said she was just afraid of her. Teacher interactions with learners were very passive where learners listened to the teachers and answered the questions asked during lessons. If teachers adopted a more hands-on approach it may reduce the passiveness and improve teacher-learner interactions.

A further aspect that emerged was that grade eight learners relied more on note reading (rote learning and cramming) than teachers' explanations as coping mechanisms as they claimed that they find Science difficult because they did not understand their teacher when she explains. This was also reported by Paloege (2009) who conducted a longitudinal study of physical science learners in the FET phase where he found that learners resorted to rote learning as a way of coping with Physical Science. The grade eight teachers did not appear to realise that their teaching approaches were very different to those of the grade seven teachers.

The fact that grade seven learners were accustomed to working in groups and engaging in practical activities were not acknowledged by the grade eight teachers and they made no attempt to adjust their teaching accordingly. During practical work, learners work in groups to realise a common goal (Ormond, 2008) and according to Johnson and Johnson (2009) in these groups learners work together to increase their own and each other's learning. When learners who are used to this approach are confronted with a very different approach to science teaching, the transition to high school becomes extremely challenging. If teachers applied a more practical approach they would be engaging learners in group work as well, thus assisting in smoothing the transition to high school.

6.2.5 Conclusion

In conclusion, the answers to my research questions may be summarised briefly:

- Learners acquire basic process skills in Grade Seven, but the more complex skills are lacking. Many learners lack communication skills because they are not proficient in the LOLT.

- Learners experience the transition from Grade Seven to Eight as challenging with regard to a number of aspects. While the complexity of the Science learnt should increase, the difference with regard to aspects such as the classroom environment, pace of teaching and expected learning, assessment and, very importantly, teaching strategies all contribute to increased difficulty in making the transition from primary to high school within the context of science learning. This results in a sharp decline in learners' enjoyment of Science between Grades Seven and Eight.

- Grade eight teachers believe learners enter Grade Eight with little understanding of science concepts. They believe that the necessary content is not taught in Grade Seven. They are of the view that learners possess very few process skills as well, but they make very little effort to develop these skills either. As the classroom environment is more formal in Grade Eight, they experience learners as ill-disciplined and lazy.

- The attitude of grade eight teachers is also not helping the learners to negotiate the transition from primary to high school smoothly in terms of teaching and learning of Natural Sciences.

They seemed not to care, and lacked interest and often were not even aware of the difficulties learners are experiencing in Grade Eight.

- Grade eight teachers do not manage the transition from Grade Seven to Grade eight within the context of Science teaching and learning very well. Little is done to assist learners in this transition process. Where efforts are made to assist learners with conceptual development little is done to assist the development of process skills and hands-on science and no effort is made to align their teaching methods with methods primary school learners are more familiar with, initially.

6.3 RECOMMENDATIONS

In conclusion, this research study indicates that learners experience difficulty in the transition from primary school to high school with regard to teaching and learning of Science. Learners are faced with various factors which affect their transition to high school. I wish to make a number of recommendations to various stakeholders which could possibly ease the transition process.

1. Subject advisors should ensure that all GET Science teachers in high schools have information regarding the content taught in Grade Seven, as well as the process skills they are expected to acquire. This will assist them in understanding what learners who enter Grade Eight are expected to know and are able to do.

2. The DoE should ensure that there are enough subject advisors in each district for Natural Sciences to facilitate better communication between science teachers in primary and high schools with regard to recommendation one. In the Umgungundlovu district there is currently only one subject advisor for NS who is unable to support schools through regular workshops and visits to schools.

3. The DoE should organise awareness programmes for teachers relating to transition. If teachers are aware that learners are experiencing difficulties adjusting to different circumstances in Grade Eight then they would be conscious of the manner in which they plan and deliver their lessons.

4. Workshops should be organised to assist teachers in making lessons more interesting and relevant to learners in transition. This could be done by providing workshops on a regular basis aimed at capacitating teachers with learner-centred approaches to teaching. Teachers currently have a poor understanding of what inquiry-based learning entails, as well as poor understanding of what active scientific investigations entail.

5. The primary schools could organise transition programmes that will prepare learners for transition. High school managements could arrange meetings with teachers, parents and learners to advice parents to monitor and provide continuous support to learners in high school. Teachers can also provide orientation to learners in relation to their expectations.

6. The DoE should provide appropriate science equipment and train teachers in the use of such equipment. This should empower them to attempt practical work more often. The building of laboratories or science rooms in schools should be a priority.

7. A more radical recommendation I wish to propose is that the DoE considers moving Grade Seven to high school as this grade forms part of the high school structure in terms of the GET- Senior phase. Currently Grade Seven is just a stand-alone in primary school and moving it to high school will ensure that grade seven and eight teachers are more aware of what is happening in each grade.

As grade eight teachers are at the forefront of the transition process and have to deal with the associated problems of transition, they need to empower themselves to deal more effectively with the challenges faced by both teachers and learners in this process of transition. The following is recommended:

1. In addition to the related recommendation above, they should form cluster groups and have cluster meetings where they can help each other and get to know exactly what is being taught in Grade Seven and grade seven teachers learn what the expectations of grade eight teachers are.

2. Familiarise themselves with science process skills in order to be able to move from teacher centred approaches and incorporate practical work (doing science) in their lessons to develop skills and concepts. This may be accomplished by attending the workshops mentioned above

6.4 FINAL CONCLUDING REMARKS

The aim of this study was to find out how learners and teachers experience the transition from Grade Seven to Grade Eight within the context of teaching and learning Science. As a primary school science teacher I am aware of certain challenges experienced by learners when they transit to high school. I therefore endeavoured to find out exactly what these challenges are. My findings provide evidence that a majority of grade eight learners experience transition from primary to high school as difficult. My study showed that a variety of factors influence the way in which learners experience transition with regard to teaching and learning of Science. Grade eight learners in this study clearly indicated that transition from Grade Seven to Grade Eight was not smooth for them in terms of learning Science.

The main issue that emanated from the study was learners' diminished enjoyment of and engagement with Science, due to their own lack of knowledge and process skills, different teaching strategies, different assessment approaches and different classroom environments. This leads to difficulty for learners to make the transition and is exacerbated by grade eight teachers' lack of understanding of the problem and consequent limited ability to manage the transition. If we wish to encourage more learners to choose Science as an FET subject should ensure that the transition from primary school is eased. I trust that my recommendations which are informed by literature that reports on similar studies in other contexts will assist in easing this transition.

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APPENDICES

APPENDIX: A

ETHICAL APPROVAL LETTER

UNIVERSITY OF
KWAZULU-NATAL

INYUVESI
YAKWAZULU-NATALI

Research Office, Govan Mbeki Centre
Westville Campus
Private Bag x54001
DURBAN, 4000
Tel No: +27 31 260 3587
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ximbap@ukzn.ac.za

20 April 2012

Mrs Sybil Cebisile Thabethe (204411243)
School of Education

Dear Mrs Thabethe

Protocol reference number: HSS/0107/012M
Project title: Negotiating the transition between primary and high school within the context of teaching and learning science: A case study in the Umgungundlovu District.

In response to your application dated 12 April 2012, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number. Please note: Research data should be securely stored in the school/department for a period of 5 years.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

.....

Professor Steven Collings (Chair)
Humanities & Social Science Research Ethics Committee

cc Supervisor Dr Michéle Stears
cc Dr D Davids
cc Mrs S Naicker/Mr N Memela

APPENDIX: B

LETTER FROM PROVINCIAL DEPARTMENT

kzn education
Department:
Education
KWAZULU-NATAL

Enquiries: Sibusiso Alwar Tel: 033 341 8610 Ref.:2/4/8/180

Ms. SC Thabethe
85 Roy Campbell Road
Napierville
3201

Dear Mrs. Thabethe

PERMISSION TO CONDUCT RESEARCH IN THE KZN DoE INSTITUTIONS

Your application to conduct research entitled: **Negotiating the Transition between Primary and High School within the Context of Teaching and Learning Science: A Case Study in UMgungundlovu District.** In the KwaZulu-Natal Department of Education Institutions has been approved. The conditions of the approval are as follows:

1. The researcher will make all the arrangements concerning the research and interviews.
2. The researcher must ensure that Educator and learning programmes are not interrupted.
3. Interviews are not conducted during the time of writing examinations in schools.
4. Learners, Educators, Schools and Institutions are not identifiable in any way from the results of the research.
5. A copy of this letter is submitted to District Managers, Principals and Heads of Institutions where the intended research and interviews are to be conducted.
6. The Period of investigation is limited to the period from 01 April 2012 to 30 April 2014.
7. Your research and interviews will be limited to the schools you have proposed and approved by the Head of Department. Please note that Principals, Educators, Departmental Officials and Learners are under no obligation to participate or assist you in your investigation.
8. Should you wish to extend the period of your survey at the school(s), please contact Mr. Alwar at the contact numbers below.
9. Upon completion of the research, a brief summary of the findings, recommendations or a full report / dissertation / thesis must be submitted to the research office of the Department. Please address it to The Director-Resources Planning, Private Bag X9137, Pietermaritzburg, 3200.
10. Please note that your research and interviews will be limited to the following Schools and Institutions:

    10.1 Zweliyazuza Primary School
    10.2 Nkabini Primary School
    10.3 Shululiwe High School
    10.4 Gobindlovu High School

Nkosinathi S.P. Sishi, PhD
Head of Department: Education

25/04/2012
Date

...dedicated to service and performance
beyond the call of duty.

APPENDIX: C

LETTER REQUESTING PERMISSION FROM CIRCUIT MANAGER

Date: February 2012

Dear Circuit manager

RE :Permission to conduct research

I am a teacher at Sombongangani Primary School. I am currently studying towards a Master's Degree in the Faculty of Education at the University of KwaZulu-Natal. The title of my study is: *Negotiating the transition between primary and high school within the context of teaching and learning science: A case study in the Umgungundlovu District.* I request permission to conduct research in the schools your ward as indicated in the letter of approval from the Dept. of Education.

The duration of data collection will be based on a program of work according to a theme or context as designed by the Senior Phase teachers and should not exceed a month. The study will consist of audiotaping during classroom observation. Lesson plans, work schedules and learners' books will be analyzed in the document analysis. Focus group Interviews and interviews will be conducted with the learners and teachers involved in the study. The data will be stored in the School of Education at UKZN and will be destroyed after a period of five years. The project will be explained to all in terms that can be understood. Participation in this study is voluntary. Only my supervisor and I will have access to information from the tapes.

Anonymity of the school and all the participants in the study will be maintained by using pseudonyms. The data obtained will be treated confidentially and will only be disseminated within the research community. Participants will not be placed in harm's way. As this is a study towards the fulfillment of a Master's Degree there is no financial gain to be obtained. The school will not be implicated in any of the cost involved in this study. Participation is voluntary and all participants are free to end their involvement at any time.

Should you have any questions or desire further information, please contact:
Researcher: Cebisile Thabethe Telephone: 0732457228 Email: scmdima@gmail.com
Supervisor: Dr. Michèle Stears Telephone: 0312603444 Email: Stearsm@ukzn.ac.za

Yours Sincerely,

_____

S.C. Thabethe

I _____ give my permission for the research to be conducted by Cebisile Thabethe (student number: 204411243), at the schools in my ward, subject to permission from the KwaZulu-Natal Department of Education. I understand that our participation is voluntary and I am free to end my involvement at any time.

_____ _____

Signature of Circuit Manager Date

APPENDIX: D

LETTER REQUESTING PERMISSION FROM PRINCIPAL

Date: February 2012

Dear Principal

RE: Permission to conduct research

I am a teacher at Sombongangani Primary School. I am currently studying towards a Master's Degree in the Faculty of Education at the University of KwaZulu-Natal. The title of my study is: *Negotiating the transition between primary and high school within the context of teaching and learning science: A case study in the Umgungundlovu District.* I request permission to conduct research in your school.

The duration of data collection will be based on a program of work according to a theme or context as designed by the Senior Phase teachers and should not exceed a month. The study will consist of audiotaping during classroom observation. Lesson plans, work schedules and learners' books will be analyzed in the document analysis. Focus group Interviews and interviews will be conducted with the learners and teachers involved in the study. The data will be stored in the School of Education at UKZN and will be destroyed after a period of five years. The project will be explained to all in terms that can be understood. Participation in this study is voluntary. Only my supervisor and I will have access to information from the tapes.

Anonymity of the school and all the participants in the study will be maintained by using pseudonyms. The data obtained will be treated confidentially and will only be disseminated within the research community. Participants will not be placed in harm's way. As this is a study towards the fulfillment of a Master's Degree there is no financial gain to be obtained. The school will not be implicated in any of the cost involved in this study. Participation is voluntary and all participants are free to end their involvement at any time.

Should you have any questions or desire further information, please contact:
Researcher: Cebisile Thabethe Telephone: 0732457228 Email: scmdima@gmail.com
Supervisor: Dr. Michèle Stears Telephone: 0312603444 Email: Stearsm@ukzn.ac.za

Yours Sincerely,

_____

S.C. Thabethe

I _____ give my permission for the research to be conducted by Cebisile Thabethe (student number: 204411243), at my school, subject to permission from the KwaZulu-Natal Department of Education. I understand that our participation is voluntary and I am free to end my involvement at any time.

_____	_____	_____
Printed Principal's Name	Signature of Principal	Date

APPENDIX: E

CONSENT LETTER FOR TEACHERS

Date: February 2012

Dear Natural Sciences Teacher

RE: Consent to participate in research

I am a teacher at Sombongangani Primary School. I am currently studying towards a Master's Degree in the Faculty of Education at the University of Kwa-Zulu Natal. The title of my dissertation is: *Negotiating the transition between primary and high school within the context of teaching and learning science: A case study in the Umgungundlovu District.*

The duration of data collection will be based on a program of work according to a theme or context as designed by the Senior Phase teachers and should not exceed a month. The study will consist of taking photographs and videotaping during classroom observation. Lesson plans, and learners' books will be analyzed in the document analysis. Interviews will be conducted with the learners and teachers involved in the study. The data will be stored in the School of Education at UKZN and will be destroyed after a period of five years. The project will be explained to all in terms that can be understood. Participation in this study is voluntary. Only my supervisor and I will have access to information from the video and tapes.

Anonymity of the school and all the participants in the study will be maintained by using pseudonyms. The data obtained will be treated confidentially and will only be disseminated within the research community. Participants will not be placed in harm's way. As this is a study towards the fulfillment of a Master's Degree there is no financial gain to be obtained. The school will not be implicated in any of the cost involved in this study. Participation is voluntary and all participants are free to end their involvement at any time.

Should you have any questions or desire further information, please contact:
Researcher: Cebisile Thabethe Telephone: 0732457228 Email: scmdima@gmail.com
Supervisor: Dr. Michèle Stears Telephone: 0312603444 Email: Stearsm@ukzn.ac.za

Yours Sincerely,

_____

S.C. Thabethe

I _____ agree to be part of the research to be conducted by Cebisile Thabethe (student number: 204411243), titled Negotiating the transition between primary and high school within the context of teaching and learning science: A case study in the Umgungundlovu District. I understand my participation is voluntary and I am free to end my involvement at any time.

_____ _____ _____

Printed Teacher's Name Signature of Teacher Date

APPENDIX: F

Dear Parent

My name is Sybil Cebisile Thabethe, studying towards a Master's Degree in Education at UKZN Edgewood Campus. My cell phone number is 0732457228.

The title of my research project is: Negotiating the transition between primary and high school within the context of teaching and learning science: A case study in the Umgungundlovu District.

Aims of my project

- I hope my project will help teachers understand the learners better when they transit to high schools.
- I hope that it will help teachers in grade 8 when they plan their lessons, knowing what the learners' experiences in grade 8 science are.
- I hope that this project will help us understand how learners make a transition from primary to high school may be which could result in some interventions from the department of education.

My project is being supervised by Dr. Michele Stears from the school of Science, Mathematics and Technology Education at UKZN Edgewood campus, her number is 031-2603444. Should you need further information about the project, please contact her.

I became interested in this project when I heard secondary teachers complaining about the learners who come to grade 8, claiming that they know nothing. I decided to do a research that will allow me to get to know what these teachers expect from grade 7 learners in terms of science skills and knowledge. On the other hand I noticed that our learners who leave grade 7 doing well in science tend not to do so well when reaching high school, I became interested in knowing what could be the reason for that.

I would like your consent to including your child in the in my research project. I would like the children in my study to answer a questionnaire which has closed ended questions, with responses ranging from strongly agree to strongly disagree. I would also like them to write a short activity on basic science skills and concepts which should take about an hour to finish.

On the following day I would like to go through the questionnaire with the children in the groups of 4 children this group interview would take about 45 minutes.

The questionnaires, activity and interviews will take place during school hours therefore I have asked for permission from the principal and teachers. I will record the interviews with the tape recorder and analyse the children's responses late. At the end of the project the tapes will be destroyed.

I assure you that your child's name and the name of the school will not appear in my thesis, or in any paper or the presentation that I will make after the study. If you decide not to sign the consent your child will not in any way be disadvantaged. Your child can withdraw from the study at any time for any reason.

Yours sincerely

S.C. Thabethe (Mrs)

Consent form

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

I understand that she/he is at liberty to withdraw from the project at any time, should she /he so desire.

…… ……

SIGNATURE OF PARENT DATE

APPENDIX: G

21 February 2012

Ngiyakubingelela Mzali

Igama lami ngingu Sybil Cebisile Thabethe, ngifundela iziqu ze Masters kwezemfundo. Ngifunda enyuvesi ikwa KwaZulu-Natal esikhungweni sase Edgewood. Inombolo yami yocingo ithi 073 245 7228.

Isihloko sophenyo lwami sithi: Negotiating the transition between primary and high school within the context of teaching and learning science: A case study in the Umgungundlovu District.

Izinhloso zophenyo

- Ngiyethemba loluphenyo luzosiza othisha ukuthi baqonde kangcono abafundi uma sebedlulela ezikoleni zamabanga aphezulu.
- Ngithemba nokuthi luyosiza othisha uma sebehlela izifundo, uma sebazi ukuthi yiziphi izinselelo abantwana ababhekana nazo uma kufundwa ezesayensi ebangeni lesi8.
- Ngiyethemba futhi ukuthi luyonezelela olwazini oselu phenyiwe ngezihloko ezihambisana nalesi.
- Ngiyethemba ukuthi luyosiza ngelinye ilanga uma abezamfundo sebakha uhlelo lokusiza abafundi ukuthi bawelele kahle ezikoleni zamabanga aphezulu maqondana nokufundwa kwezesayensi.

Uphenyo lwami lwenganyelwe uDokotela Michele Stears emkhakheni wezeSayensi, Izibalo kanye nezoBuchwepheshe enyuvesi iKwaZulu-Natal esikhungeni sase Edgewood. Inombolo yakhe yocingo ithi 031- 2603444 ungamshayela uma udinga ulwazi oluthe thuthu mayelana nophenyo.

Ukuzwa othisha base mazingeni aphakeme emfundo besola, ngabantwana abanenkolelo yokuthi abazi lutho ebangeni lesi 8 yiko okwangenza ngaba nogqozi lokwenza loluphenyo. Ngakolunye uhlangothi ngibone abafundi ekade benza kahle emazingeni aphansi emfundo bengaphumeleli ngendlela emazingeni aphezulu kwezesayensi abanye beziyeka qobo izifundo zeSayensi.

Bengicela imvume yokubandakanya nomntwana wakho kulolu phenyo. Ngizothanda abantwana kuloluphenyo baphendule imibuzo lapho bezokhetha khona izimpenendulo

kusukela kungiyavuma impela kuya angivumi sampela. Bengithanda ukuba babhale nomsebenzi omfishane omayelana namakhono nokufundwayo kweze sayensi. Lomsebenzi ungathatha ihora libelinye nje vo ukuwuqeda.

Bengifisa ukuthi ngosuku olulandelayo ngixoxisane nabantwana ngemibuzo yequestionnaire ngamaqebu kuyoba abantwana abane ngeqembu ngalinye. Lokho kothatha nje imizuzu engama 45.

I questionnaire, umsebenzi kanye nama interview kuyokwenziwa ngesikhathi sesikole ngaleso sizathu ngicele imvume kuThisha omkhulu nakothisha. Ngiyoqopha ngesiqopha mazwi izimpendulo ze interview bese ngizihlaziya kahle izimpendulo emva kwesikhathi. Uma seluphelile uphenyo okuqoshiwe kuyo bulawa.

Ngiyaqinisekisa ukuthi igama lomntwana wakho nesikole sakhe akuyikuvela emqulwini wami obizwa ngethesis noma ikuphi lapho ngothula khona izinkulumo ngemuva kophenyo. Uma kwenzeka ukhetha ukungasayini imvume yokuthi umntwana wakho abe yingxenye yaloluphenyo, umntwana akayikulahlekelwa yilutho. Umntwana wakho angahoxa noma inini kuloluphenyo nangaziphi izizathu.

Ozithobayo

S.C. Thabethe (Mrs)

Ifomu lemvume

Mina…… (amagama aphelele omzali) ngiyavuma ukuthi ngiyifundile lencwadi engenhla futhi ngiyakuqonda konke okubhalwe kuyona nesimo socwaningo. Ngiyavuma ukuthi umntwana wami abeyigxenye yocwaningo.

Ngiyaqonda futhi ukuthi ukhululekile ukuthi angahoxa noma inini kulolucwaningo uma ethanda.

..…… ……

ISIGINASHA YOMZALI USUKU

APPENDIX: H

UNIVERSITY OF KWAZULU-NATAL

25 February 2012

Dear Learner

My name is Sybil Cebisile Thabethe, studying towards a Master's Degree in Education at UKZN Edgewood Campus. My cell phone number is 0732457228.

The title of my research project is: Negotiating the transition between primary and high school within the context of teaching and learning science: A case study in the Umgungundlovu District.

Aims of my project

- I hope my project will help teachers understand the learners better when they transit to high schools.
- I hope that it will help teachers in grade 8 when they plan their lessons, knowing what the learners' experiences in grade 8 science are.
- I hope that this project will help us understand how learners make a transition from primary to high school, may be which could result in some interventions from the department of education.

My project is being supervised by Dr. Michele Stears from the school of Science, Mathematics and Technology Education at UKZN Edgewood campus, her number is 031-2603444. Should you need further information about the project, please contact her.

I became interested in this project when I heard secondary teachers complaining about the learners who come to grade 8, claiming that they know nothing. I decided to do a research that will allow me to get to know what these teachers expect from grade 7 learners in terms of science skills and knowledge. On the other hand I noticed that our learners who leave grade 7 doing well in science tend not to do so well when reaching high school, I became interested in knowing what could be the reason for that.

I would like your consent to include you in my research project. I would like you to complete a questionnaire which has closed ended questions, with responses ranging from strongly agree to strongly disagree. I would also like you to do a short activity on basic science skills and concepts which should take about an hour to finish.

On the following day I would like to go through the questionnaire with you in the groups. This group interview would take about 45 minutes.

The questionnaires, learner's activity and interviews will take place during school hours therefore I have asked for permission from the principal and teachers. I will record the interviews on an audio cassette.

I assure you that your name and the name of your school will not appear in my thesis, or in any paper or presentations that I will make after the study. If you decide not to sign the consent form you will not in any way be disadvantaged. You can withdraw from the study at any time for any reason.

Yours sincerely

S .C. Thabethe (Mrs)

Consent form

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

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

…… ……

SIGNATURE OF PARTICIPANT DATE

APPENDIX: I

CLASSROOM OBSERVATION SCHEDULE

Teacher Name: ..... Gender: .....

Qualifications: .....

School Name: .....

School Category (Urban/Rural).....

Grade level: .....

No. of learners: ……..

Learning Area: .....

Date of observation: .....

Topic and key concepts:.....

To what extent did the teacher promote the use the development of science process skills:

Teacher Action	**Comments**
Expects learners to answer closed questions	
Expects learners to answer open-ended questions	
Expects learners to observe	

similarities and differences	
The activity requires learners to record results	
The activity requires learners to do measurements	
Activity requires learners to compare and contrast	
Learners are required to record results in a variety of ways	
Expects learners to work independently	
Expects learners to	

hypothesise?	
Learners are encouraged to make predictions and ask ‘what if’ questions/	

APPENDIX: J

GRADE 8 TEACHER INTERVIEW SCHEDULE

1. Do you think the science taught at primary prepare learners enough to cope with science in grade 8? Please explain your answer.

2. What science skills do you think grade 7 learners should possess? Please provide examples.

3. Please give some examples of the concepts you expect your learners to have learnt in grade 7.

4. What strategies do you use to bridge the gap between what grade7 learners know and what they should know in grade 8?

5. Do you link primary science to science learnt in grade 8 so that the learners can see the connection?

6. With regard to science learning, what do you think is lacking, when learners enter Grade?

7. Are learners able to engage meaningfully in practical activities when they enter Grade 8?

8. Do you know what science is taught in Grade 7?

9. Do you think Grade7 teachers can competently teach science? Give reasons for your answer.

APPENDIX: K

QUESTIONNAIRE: GRADE 7 NATURAL SCIENCES TEACHERS

Kindly note the following:

- Complete all the questions as honestly as possible.
- There are no wrong or right answers.
- The questionnaire is anonymous and each teacher's response will be treated with strict confidence.
- You are assured that your identity and the research will not be revealed.

SECTION A: BIOGRAPHICAL DATA.

1. Age this year

20 – 25	26 – 30	31 – 39	40 - 45	46 - 50	51 – 60

2. Gender

Female	Male

3. Qualifications

a. Professional (e.g. STD) _____
b. Academic (STD 10, B.Sc.)_____

4. School teaching experience (years)
   a. Total years of teaching_____
   b. Years teaching Natural Sciences_____

SECTION B: Process Skills

1 .Do you facilitate the development of observation skills? If your answer is yes, give two examples of how this is done. Mention the topics that were taught.If your answer is no what are your reasons for not doing so?

_____
_____
_____

2. Do you ask your learners to classify objects or organisms? If your answer is yes,please provide examples of two activities in which this is done. If your answer is no what are your reasons for not doing so?

_____

3. Do you give your learners activities in which they are required to compare and contrast objects or organisms? If your answer is yes please provide examples of two activities in which this is done. If your answer is no what are your reasons for not doing so?

_____
_____
_____
_____

4. Do youprovide opportunities for your learners to communicate information in different ways? If your answer is yes give examples of ways in which they communicate their findings?

_____
_____
_____

5. Do you encourage your learners to develop flow charts or mind maps to show their understanding of scientific concepts? If you answer is yes give examples of topics where you applied this approach.

_____
_____
_____

6. Do you always demonstrate experiments to your learners? If your answer is yes how do you ensure they know and can identify the equipment for conducting a particular experiment?

_____
_____
_____

7. Do you teach learners the skill of measuring? If your answer is yes please explain how do you do this?

_____
_____
_____

8.1 When teaching the learners to conduct investigations do you at times allow them to identify phenomena to be studied or do you provide the topic to be studied?

_____
_____
_____

8.2. Are learners given the opportunity to identify problems when conducting investigations?

_____
_____
_____

8.3. Do you encourage your learners to respond to ‘what if’ questions when conducting investigations?

_____
_____
_____

Thank you for your cooperation.

Document analysis.

Grade 7 Learners' workbooks will be scrutinised for evidence of activities aimed at developing process skills.

When such activities are identified, they will be analysed by looking for evidence of specific process skills deemed appropriate at Grade 7 level.

Grade 7 Activity

I will design an activity that requires the use of a number of process skills. The activity will be discussed with the teacher and she/he will be requested to use the activity in one of the observed lessons.
The activity can only be designed after determining what topics are being taught at the time of data collection.

APPENDIX: L

QUESTIONNAIRE: GRADE 8 NATURAL SCIENCES LEARNERS

Kindly note the following:

- Complete all the questions as honestly as possible.
- There are no wrong or right answers.
- The questionnaire is anonymous and each learner's response will be treated with strict confidence.
- You are assured that your identity and the research site will not be revealed.

SECTION A: BIOGRAPHICAL DATA.

1. Age this year

12	13	14	15

2. Gender

Female	Male

SECTION B LEARNER QUESTIONNAIRE

For each of the following statements indicate with a cross whether you Strongly agree, agree, are unsure, disagree or strongly disagree.

SA= strongly agree; A= agree; U =unsure; D=disagree; Strongly disagree

	SA	A	U	D	SD
1.I enjoyed science in Grade 7					
2. My teacher showed us many experiments.					
3.My teacher allowed us to do experiments					
4.We often did science outside the classroom					
5. I enjoyed doing practical work in grade 7					
6. I enjoyed doing drawings in science in Grade 7					
7. We often worked in groups in Grade 7					
8. I enjoyed working in groups in grade 7					
9.We never wrote science tests in Grade 7					
10. We often had homework in science in Grade 7					
11. I enjoy science in Grade 8					
12. We get more homework in Grade 8 than Grade 7					
13. We do much more science in Grade 8 than in Grade 7					
14. My teachers expects us to know a lot of science					

15. We don’t work in groups as often in Grade 8 as we used to in Grade 7.					
16. We do more practical work in Grade 8					
17. I enjoy doing practical work					
18.We have to write much more in Grade 8					
19. We write more tests in grade 8					
20. We have to do more assignments in Grade 8					
21.We work from the textbook in Grade 8					
22. My teacher expects us to work more on our own than we did in Grade 7					
23. I find Grade 8 science difficult					

Focus Group Interviews

The purpose of focus group interviews is to probe learners' responses in the questionnaire to obtain a deeper understanding of these responses. Questions with regard to the questionnaire will be posed to groups and they will be asked to talk to each other about their feelings and experiences. As researcher I will remain in the background while learners interact with each other.

APPENDIX: A

ETHICAL APPROVAL LETTER

APPENDIX: B

LETTER FROM PROVINCIAL DEPARTMENT

APPENDIX: C

LETTER REQUESTING PERMISSION FOR CIRCUIT MANAGER

Date: February 2012

Dear Circuit manager

RE :Permission to conduct research

I am a teacher at Sombongangani Primary School. I am currently studying towards a Master's Degree in the Faculty of Education at the University of KwaZulu-Natal. The title of my study is: *Negotiating the transition between primary and high school within the context of teaching and learning science: A case study in the Umgungundlovu District.* I request permission to conduct research in the schools your ward as indicated in the letter of approval from the Dept. of Education.

The duration of data collection will be based on a program of work according to a theme or context as designed by the Senior Phase teachers and should not exceed a month. The study will consist of audiotaping during classroom observation. Lesson plans, work schedules and learners' books will be analyzed in the document analysis. Focus group Interviews and interviews will be conducted with the learners and teachers involved in the study. The data will be stored in the School of Education at UKZN and will be destroyed after a period of five years. The project will be explained to all in terms that can be understood. Participation in this study is voluntary. Only my supervisor and I will have access to information from the tapes.

Anonymity of the school and all the participants in the study will be maintained by using pseudonyms. The data obtained will be treated confidentially and will only be disseminated within the research community. Participants will not be placed in harm's way. As this is a study towards the fulfillment of a Master's Degree there is no financial gain to be obtained. The school will not be implicated in any of the cost involved in this study. Participation is voluntary and all participants are free to end their involvement at any time.

Should you have any questions or desire further information, please contact:
Researcher: Cebisile Thabethe Telephone: 0732457228
Email: scmdima@gmail.com
Supervisor: Dr. Michèle Stears Telephone: 0312603444
Email: Stearsm@ukzn.ac.za

Yours Sincerely,

_____
S.C. Thabethe

I _____ give my permission for the research to be conducted by Cebisile Thabethe (student number: 204411243), at the schools in my ward, subject to permission from the KwaZulu-Natal Department of Education. I understand that our participation is voluntary and I am free to end my involvement at any time.

Signature of Circuit Manager Date

_____ _____

APPENDIX: D

LETTER REQUESTING PERMISSION FOR PRINCIPAL

Date: February 2012

Dear Principal

RE :Permission to conduct research

I am a teacher at Sombongangani Primary School. I am currently studying towards a Master's Degree in the Faculty of Education at the University of KwaZulu-Natal. The title of my study is: *Negotiating the transition between primary and high school within the context of teaching and learning science: A case study in the Umgungundlovu District.* I request permission to conduct research in your school.

The duration of data collection will be based on a program of work according to a theme or context as designed by the Senior Phase teachers and should not exceed a month. The study will consist of audiotaping during classroom observation. Lesson plans, work schedules and learners' books will be analyzed in the document analysis. Focus group Interviews and interviews will be conducted with the learners and teachers involved in the study. The data will be stored in the School of Education at UKZN and will be destroyed after a period of five years. The project will be explained to all in terms that can be understood. Participation in this study is voluntary. Only my supervisor and I will have access to information from the tapes.

Anonymity of the school and all the participants in the study will be maintained by using pseudonyms. The data obtained will be treated confidentially and will only be disseminated within the research community. Participants will not be placed in harm's way. As this is a study towards the fulfillment of a Master's Degree there is no financial gain to be obtained. The school will not be implicated in any of the cost involved in this study. Participation is voluntary and all participants are free to end their involvement at any time.

Should you have any questions or desire further information, please contact:

Researcher: Cebisile Thabethe Telephone: 0732457228 Email: scmdima@gmail.com
Supervisor: Dr. Michèle Stears Telephone: 0312603444 Email: Stearsm@ukzn.ac.za

Yours Sincerely,

_____
S.C. Thabethe

I _____ give my permission for the research to be conducted by Cebisile Thabethe (student number: 204411243), at my school, subject to permission from the KwaZulu-Natal Department of Education. I understand that our participation is voluntary and I am free to end my involvement at any time.

Printed Principal's Name Signature of Principal Date

_____ _____ _____

APPENDIX: E

CONSENT LETTER FOR TEACHERS

Date: February 2012

Dear Natural Sciences Teacher

RE: Consent to participate in research

I am a teacher at Sombongangani Primary School. I am currently studying towards a Master's Degree in the Faculty of Education at the University of Kwa-Zulu Natal. The title of my dissertation is: *Negotiating the transition between primary and high school within the context of teaching and learning science: A case study in the Umgungundlovu District.*

The duration of data collection will be based on a program of work according to a theme or context as designed by the Senior Phase teachers and should not exceed a month. The study will consist of taking photographs and videotaping during classroom observation. Lesson plans, and learners' books will be analyzed in the document analysis. Interviews will be conducted with the learners and teachers involved in the study. The data will be stored in the School of Education at UKZN and will be destroyed after a period of five years. The project will be explained to all in terms that can be understood. Participation in this study is voluntary. Only my supervisor and I will have access to information from the video and tapes.

Anonymity of the school and all the participants in the study will be maintained by using pseudonyms. The data obtained will be treated confidentially and will only be disseminated within the research community. Participants will not be placed in harm's way. As this is a study towards the fulfillment of a Master's Degree there is no financial gain to be obtained. The school will not be implicated in any of the cost involved in this study. Participation is voluntary and all participants are free to end their involvement at any time.

Should you have any questions or desire further information, please contact:

Researcher: Cebisile Thabethe Telephone: 0732457228 Email: scmdima@gmail.com
Supervisor: Dr. Michèle Stears Telephone: 0312603444 Email: Stearsm@ukzn.ac.za

Yours Sincerely,

_____
S.C. Thabethe

I _____ agree to be part of the research to be conducted by Cebisile Thabethe (student number: 204411243), titled Negotiating the transition between primary and high school within the context of teaching and learning science: A case study in the Umgungundlovu District. I understand my participation is voluntary and I am free to end my involvement at any time.

_____ _____ _____ _____
Printed Teacher's Name Signature of Teacher Date

APPENDIX: F

Dear Parent

My name is Sybil Cebisile Thabethe, studying towards a Master's Degree in Education at UKZN Edgewood Campus. My cell phone number is 0732457228.

The title of my research project is: Negotiating the transition between primary and high school within the context of teaching and learning science: A case study in the Umgungundlovu District.

Aims of my project

- I hope my project will help teachers understand the learners better when they transit to high schools.
- I hope that it will help teachers in grade 8 when they plan their lessons, knowing what the learners' experiences in grade 8 science are.
- I hope that this project will help us understand how learners make a transition from primary to high school may be which could result in some interventions from the department of education.

My project is being supervised by Dr. Michele Stears from the school of Science, Mathematics and Technology Education at UKZN Edgewood campus, her number is 031- 2603444. Should you need further information about the project, please contact her.

I became interested in this project when I heard secondary teachers complaining about the learners who come to grade 8, claiming that they know nothing. I decided to do a research that will allow me to get to know what these teachers expect from grade 7 learners in terms of science skills and knowledge. On the other hand I noticed that our learners who leave grade 7 doing well in science tend not to do so well when reaching high school, I became interested in knowing what could be the reason for that.

I would like your consent to including your child in the in my research project. I would like the children in my study to answer a questionnaire which has closed ended questions, with responses ranging from strongly agree to strongly disagree. I would also like them to write a short activity on basic science skills and concepts which should take about an hour to finish.

On the following day I would like to go through the questionnaire with the children in the groups of 4 children this group interview would take about 45 minutes.

The questionnaires, activity and interviews will take place during school hours therefore I have asked for permission from the principal and teachers. I will record the interviews with the tape recorder and analyse the children's responses late. At the end of the project the tapes will be destroyed.

I assure you that your child's name and the name of the school will not appear in my thesis, or in any paper or the presentation that I will make after the study. If you decide not to sign the consent your child will not in any way be disadvantaged. Your child can withdraw from the study at any time for any reason.

Yours sincerely

S.C. Thabethe (Mrs)

Consent form

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

I understand that she/he is at liberty to withdraw from the project at any time, should she /he so desire.

…… ……

SIGNATURE OF PARENT DATE

APPENDIX: G

21 February 2012

Ngiyakubingelela Mzali

Igama lami ngingu Sybil Cebisile Thabethe, ngifundela iziqu ze Masters kwezemfundo. Ngifunda enyuvesi ikwa KwaZulu-Natal esikhungweni sase Edgewood. Inombolo yami yocingo ithi 073 245 7228.

Isihloko sophenyo lwami sithi: Negotiating the transition between primary and high school within the context of teaching and learning science: A case study in the Umgungundlovu District.

Izinhloso zophenyo

- Ngiyethemba loluphenyo luzosiza othisha ukuthi baqonde kangcono abafundi uma sebedlulela ezikoleni zamabanga aphezulu.
- Ngithemba nokuthi luyosiza othisha uma sebehlela izifundo, uma sebazi ukuthi yiziphi izinselelo abantwana ababhekana nazo uma kufundwa ezesayensi ebangeni lesi8.
- Ngiyethemba futhi ukuthi luyonezelela olwazini oselu phenyiwe ngezihloko ezihambisana nalesi.
- Ngiyethemba ukuthi luyosiza ngelinye ilanga uma abezamfundo sebakha uhlelo lokusiza abafundi ukuthi bawelele kahle ezikoleni zamabanga aphezulu maqondana nokufundwa kwezesayensi.

Uphenyo lwami lwenganyelwe uDokotela Michele Stears emkhakheni wezeSayensi, Izibalo kanye nezoBuchwepheshe enyuvesi iKwaZulu-Natal esikhungeni sase Edgewood. Inombolo yakhe yocingo ithi 031- 2603444 ungamshayela uma udinga ulwazi oluthe thuthu mayelana nophenyo.

Ukuzwa othisha base mazingeni aphakeme emfundo besola, ngabantwana abanenkolelo yokuthi abazi lutho ebangeni lesi 8 yiko okwangenza ngaba

nogqozi lokwenza loluphenyo. Ngakolunye uhlangothi ngibone abafundi ekade benza kahle emazingeni aphansi emfundo bengaphumeleli ngendlela emazingeni aphezulu kwezesayensi abanye beziyeka qobo izifundo zeSayensi.

Bengicela imvume yokubandakanya nomntwana wakho kulolu phenyo. Ngizothanda abantwana kuloluphenyo baphendule imibuzo lapho bezokhetha khona izimpenendulo kusukela kungiyavuma impela kuya angivumi sampela. Bengithanda ukuba babhale nomsebenzi omfishane omayelana namakhono nokufundwayo kweze sayensi. Lomsebenzi ungathatha ihora libelinye nje vo ukuwuqeda.

Bengifisa ukuthi ngosuku olulandelayo ngixoxisane nabantwana ngemibuzo yequestionnaire ngamaqebu kuyoba abantwana abane ngeqembu ngalinye. Lokho kothatha nje imizuzu engama 45.

I questionnaire, umsebenzi kanye nama interview kuyokwenziwa ngesikhathi sesikole ngaleso sizathu ngicele imvume kuThisha omkhulu nakothisha. Ngiyoqopha ngesiqopha mazwi izimpendulo ze interview bese ngizihlaziya kahle izimpendulo emva kwesikhathi. Uma seluphelile uphenyo okuqoshiwe kuyo bulawa.

Ngiyaqinisekisa ukuthi igama lomntwana wakho nesikole sakhe akuyikuvela emqulwini wami obizwa ngethesis noma ikuphi lapho ngothula khona izinkulumo ngemuva kophenyo. Uma kwenzeka ukhetha ukungasayini imvume yokuthi umntwana wakho abe yingxenye yaloluphenyo, umntwana akayikulahlekelwa yilutho. Umntwana wakho angahoxa noma inini kuloluphenyo nangaziphi izizathu.

Ozithobayo

S.C. Thabethe (Mrs)

Ifomu lemvume

Mina……
(amagama aphelele omzali) ngiyavuma ukuthi ngiyifundile lencwadi engenhla futhi ngiyakuqonda konke okubhalwe kuyona nesimo socwaningo. Ngiyavuma ukuthi umntwana wami abeyigxenye yocwaningo.

Ngiyaqonda futhi ukuthi ukhululekile ukuthi angahoxa noma inini kulolucwaningo uma ethanda.

ISIGINASHA YOMZALI USUKU

_____ _____

APPENDIX: H

25 February 2012

Dear Learner

My name is Sybil Cebisile Thabethe, studying towards a Master's Degree in Education at UKZN Edgewood Campus. My cell phone number is 0732457228.

The title of my research project is: Negotiating the transition between primary and high school within the context of teaching and learning science: A case study in the Umgungundlovu District.

Aims of my project

- I hope my project will help teachers understand the learners better when they transit to high schools.
- I hope that it will help teachers in grade 8 when they plan their lessons, knowing what the learners' experiences in grade 8 science are.
- I hope that this project will help us understand how learners make a transition from primary to high school, may be which could result in some interventions from the department of education.

My project is being supervised by Dr. Michele Stears from the school of Science, Mathematics and Technology Education at UKZN Edgewood campus, her number is 031- 2603444. Should you need further information about the project, please contact her.

I became interested in this project when I heard secondary teachers complaining about the learners who come to grade 8, claiming that they know nothing. I decided to do a research that will allow me to get to know what these teachers expect from grade 7 learners in terms of science skills and knowledge. On the other hand I noticed that our learners who leave grade 7 doing well in science tend not to do so well when reaching high school, I became interested in knowing what could be the reason for that.

I would like your consent to include you in my research project. I would like you to complete a questionnaire which has closed ended questions, with responses ranging from strongly agree to strongly disagree. I would also like you to do a short activity on basic science skills and concepts which should take about an hour to finish.

On the following day I would like to go through the questionnaire with you in the groups. This group interview would take about 45 minutes.

The questionnaires, learner's activity and interviews will take place during school hours therefore I have asked for permission from the principal and teachers. I will record the interviews on an audio cassette.

I assure you that your name and the name of your school will not appear in my thesis, or in any paper or presentations that I will make after the study. If you decide not to sign the consent form you will not in any way be disadvantaged. You can withdraw from the study at any time for any reason.

Yours sincerely

S .C. Thabethe (Mrs)

Consent form

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

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

…… ……

SIGNATURE OF PARTICIPANT DATE

APPENDIX N

ZAMELISIZWE HIGH SCHOOL

Grade 8 Teacher Interview Schedule

Reseearcher: Do you think the science taught at primary prepare learners enough to cope with science in grade 8? Please explain your answer.

Miss Hadebe: Uhm since the learners come from different schools there are those who are good and there are those which it's clear that some of the work has not been done I don't know for what reasons but another thing is when they come to grade eight they are good in recalling rather than understanding for instance when you give them the definition photosynthesis is they can recall that without understanding what it is (probing in a nutshell you are saying it depends from which primary school they come from?) Yes, basically it depends on the teachers and the method of teaching I personally feel that they are not given the chance to understand the concept they are given the opportunity to know and regurgitate everything correctly but they do not have understanding but some do, they do understand. Most of them do not understand they just cram the work when you break the same definition into parts they just don't understand.

Researcher: What science skills do you think grade 7 learners should possess? Please provide examples.

Miss Hadebe: They should be able to write well observe, listen and because of their age they are not good at listening they cannot concentrate for long. They should be able to draw, the sketches that they draw are scary because when you ask them to bring back that sketch they will give a sketch from mars(probing I understand that in science they have to draw and in their learning in all other learning areas they have to be able to listen but in terms of science skills what other skills including observations you would have loved them to poses?) Some have demonstrated that are capable of conducting experiments that does not require the use of chemical like we did at the beginning of the year, they themselves did the experiment of autotrophs(probing again: What is autotroph?) It is when you put the plant in the box and you make an opening where the sun will get inside the box and the plant will change its growing direction and grow towards the light. (Probing once more: When the learners were doing that investigation were they given the chance or required to make the hypothesis or predict what will happen?) Yes, but I think they had a background knowledge as to what was going to happen. I had given them the task where they had to find the hypothesis and follow the instructions to conduct the investigation. Some of them were too general but very creative though.

Researcher: Please give some examples of the concepts you expect your learners to have learnt in grade 7.

Miss Hadebe: Aboitic , biotic factors and give examples. Differences between compounds and elements, impure and pure substances, metals and non-metal(examples).

Researcher: What strategies do you use to bridge the gap between what grade7 learners know and what they should know in grade 8?

Miss Hadebe:I do my homework as soon as I enter the class I ask questions and I find out how many are familiar with the topic…… I would not say that there is much gap though it depends…… I reintroduce the topic from scratch to accommodate those who did not deal with the topic in grade 7.

Researcher: Do you link primary science to science learnt in grade 8 so that the learners *can see the connection?*

Miss Hadebe: I don't have much knowledge of what is being done there in grade 7 but I capitalize on their knowledge and try to integrate…..they can recall, like they can recall the names of chemicals they used, the chemicals that they are familiar with to create compounds.

Researcher: With regard to science learning, what do you think is lacking, when learners enter Grade 8?

Miss Habede: I really don't think they are lacking much the thing is learners forget things learned in the previous grades. When you start explaining some will realise and remember that they did that in Grade Seven other won't. Some have science skills and knowledge but others lack good behaviour they are not serious about their school work.

Reseacher: Are learners able to engage meaningfully in practical activities when they enter Grade 8?

Miss Hadebe: Yes they are.

Researcher: Do you know what science is taught in Grade 7?

***Miss Hadebe: As i said earlier on I really don't have an idea what's going on there at* primaries.**

Researcher: Do you think Grade7 teachers can competently teach science?

Give reasons for your answer.

Miss Hadebe: Yes they are because there is an integration between grade 7 and grade8 science. Learners are able to do things like simple circuits on their own without my help. That say the teachers are competent in science.

Thank you this brings us to the end of our interview!!!

AMANZAMHLOPHE HIGH SCHOOL

Grade 8 Teacher Interview Schedule

Reseacher: Do you think the science taught at primary prepare learners enough to cope with science in grade 8? Please explain your answer.

Miss Thwala: LOOKING AT THE LEARNERS AS WE AT THE END OF THE SECOND TERM I'VE DISCOVERED THAT THEY ARE LACKING MOST SKILLS IN SCIENCE FOR EXAMPLE THE SKILLS THAT ARE EXPECTED IN LEARNERS ARE MAYBE SKILLS LIKE TO OBSERVE TO BE ABLE TO MAKE SOME RECORDING OF THE INFORMATION, BASICALLY THE LISTENING SKILLS AND THE WRITING SKILLS ALL THOSE SKILLS THEY GO TOGETHER WITH MORE ESPECIALLY THE RESEARCH PART SO OUR LEARNERS THEY SEEM TO LACK ON HOW TO CONDUCT A RESEARCH LIKE HOW TO LOOK FOR INFORMATION ON THEIR OWN. THE SKILLS ARE NOT THERE BECAUSE SOME THESE LEARNERS ARE LAZY AND DO NOT CARE ABOUT THEIR SCHOOL. THEY DON'T COMPLETE TASKS IN CLASS AND AT HOME, THEY ARE NOT BOTHERED BECAUSE THEY KNOW YOU WON'T PUNISH THEM.

SO MAYBE WE NEED TO CONSIDER IF WE CAN HAVE SOME INTERACTION WITH THE PEOPLE FROM PRIMARY SCHOOL SO THAT WE SEE IF WE ABLE ASSIST THEM THAT THIS IS WHAT WE ARE EXPECTING THEN WE SEE THAT THESE ARE CHALLENGES ARE THEY ACTUALLY HAVING

Researcher: (PROBING IN SHORT ARE YOU SAYING THAT THEY ARE NOT FULLY PREPARED TO COPE IN GRADE 8?)

Miss Thwala: YES.

Researcher: What science skills do you think grade 7 learners should possess? Please provide examples.

Miss Thwala: LEARNERS IN PRIMARY SCHOOL AS THEY ARE YOUNG LIKE TO BE HANDS-ON TO DO THINGS ON THEIR OWN TO DO THEIR OWN FINDINGS TO DO INVESTIGATIONS TO BE ABLE TO....LEARNERS IN PRIMARY SCHOOL ARE MORE CUROIUS MAY BE IF YOU TRIGGER THEM TO BE ABLE TO THINK CREATIVELY AND CONSTRUCTIVELY.....LIKE TO HYPOTHESISE WHAT IS GONNA HAPPEN AND THEY SEE IT HAPPENING SO I THINK THOSE ARE THE BASIC SKILLS FOR THE LEARNERS BECAUSE THE YOUNG ONES THEY ARE MORE ON TOUCHING AND BEING HANDS-ON SO WHICH THESE LEARNERS ARE SO ..'... THEY ARE JUST ADÚLT KIDS. THEY ARE JUST SCARED THEY DON'T WANT TO DO THINGS AS THE LEARNERS FROM PRIMARY SCHOOL ARE SUPPOSE TO. (PROBING

CAN YOU GIVE ME SOME EXAMPLES LIKE WHEN YOU SAY THEY MUST BE HANDS ON WHAT DO YOU MEAN? YOU CAN USE ANY EXAMPLE FROM LIFE AND LIVING or MATTER AND MATERIALS WHEN YOU SAY THEY MUST BE HANDS ON YOU WANT TO SEE THEM DOING WHAT?) LIKE WHEN I WAS DOING THE ATOMS AND MOLECULES WHEN I WAS SHOWING THEM THESE CHEMICALS OTHERS DIDN'T EVEN WANT TO TOUCH, OR SMELL THEM THEY WERE JUST SCARED SO THEY ARE UNLIKE LEARNERS. LEARNERS I'M SUPPOSE TO BE REPRIMANDING THEM SAYING WHOA, WHOA DONT TOUCH THAT OR DON'T EAT THAT, THEY ARE SUPPOSE TO BE KEEN TO KNOW. IM SUPPOSE TO BE REMINDING THEM ABOUT THE RULES.THEY MUST BE CURIOUS TO DO THINGS AND BE WILLING TO HELP BUT THEY ARE SCARED EVEN IF YOU DO IT THEY ARE WITHHELD. SO IT'S UNLIKE THE LEARNERS FROM PRIMARY SCHOOL THEY HAVE THE FEARS OF THE UNKNOWN THEY DONT WANT TO GO AND EXPERIENCE THING FOR THEMSELVES.

Researcher: Please give some examples of the concepts you expect your learners to have learnt in grade 7.

Miss Thwala: SO FAR AS I HAVE WORKED WITH THEM IN LIFE AND LIVING AND THIS TERM WE ARE ON MATTER AND MATERIALS AT LEAST NORMALLY THEY HAVE GOT MORE THEORY THAN PRACTICAL SO IT SEEMS LIKE THEY ARE DRILLED ITS NOT LIKE THEY..... FOR EXAMPLE WHEN WE TALK ABOUT THE ECOSYSTEM THEY CANNOT GIVE ME THE EXAMPLES WHERE WOULD YOU GET IT.....THEY GO THERE TO THE POT PLANT OF THE SCHOOL I SAY GO THERE AND IDENTIFY AN ECOSYSTEM LOOK OUTSIDE AND SEE IF YOU CAN FIND THE ECOSYSTEM BUT IF YOU ASK THEM THE QUESTIONS THEY KNOW. THEY CANNOT TAKE THEIR KNOWLEDGE TO THE REAL LIFE

Researcher: What strategies do you use to bridge the gap between what grade7 learners know and what they should know in grade 8?

Miss Thwala: UHM ACCORDING TO THE PLAN I HAVE ITS JUST TO MAKE THESE....LIKE WHEN I TALK OF WATER THEY MUST KNOW THAT WATER IS THE COMBINATION OF H_2 O SO THEY MUST KNOW THE HYDROGEN AND OXYGEN AND HOW IS HYDROGEN FORMED AND HOW IS OXYGEN FORMED SO IF YOU TAKE IT ON THAT THE EXAMPLES WHERE THEY LOOK AT ICE AAS ICE AND WATER AS WATER.... SO AT LEAST YOU AT IT IN THE REAL LIFE FOR EXAMPLE WHEN I WAS TALKING TO THEM ABOUT ELEMENTS SO THAT WE ARE ABLE TO TRANSLATE THESE ELEMENTS INTO ZULU WORDS FOR INSTANCE SULPHUR – ISIBALULE.... SOTHEY KNOW THAT WHEN WE TALK OF SCIENCE ITS IN OUR DAILY LIVES ITS NOT SOMETHIN THAT IS IN THE SCHOOL IN THE CLASSROOM BUT ITS ALL ABOUT WHAT WE LIVE. THEY KOW THAT WE CAN'T MAKE

FOOD ON OUR OWN AS PEOPLE BUT WE GET IT FROM THE SUN. EVEN THERE KNOW YOU TAKE IT TO MORE REAL LIFE TO THE EXIXSTENCE ... SO WITH THESE LEARNERS WHAT I HAVE IDENTIFIED IS THAT IT DOES NOT MAKE SENSE TO THEM THAT WHAT .....BUT NOW LOOKING AT THE STRATEGIES THEY CAN BE THERE BUT TO PRACTICE TO TAKE THESE STRATEGIES INTO PRACTICE ITS A CHALLENGE BECAUSE

1. RESOURCES OF MAKING THOSE REAL THINGS ARE LACKING LIKE WHEN I WANTED TO MAKE THOSE MODELS OF ELEMENTS AND COMPOUNDS IS NOT EASY EVEN IF YOU WANT TO TAKE OUT OF YOUR POCKET YOU WANT TO O AND BUY THESE CLAY ITS TOO MUCH THE CLASS IS TOO BIG ABOUT 61 LEARNERS IN CLASS SO HOW MUCH AM I GONNA SPEND BUYIN THOSE FOOD COLOURINGS SOTHAT YOU CAN COLOUR THOSE DIFFERENT MODELS TO MAKE THESE SO REALLY IT BECOMES DIFFICULT BUT I'M STILL WORKIN ON IT TO MAKE SENSE . YOU KNOW WHEN YOU O TO THE HOD'S AND YOU TELL THEM THE DIFFICULTIES WE ENCOUNTER IN CLASS BUT TAKIN ON STEP AT A TIME WE DON'T KNOW THE DURATION BUT ONE DAY WE WILL TEACH THIS NATURAL SCIENCE THE WAY WE ARE SUPPOSE TO AND WE WILL GET THE RESULTS WE ARE EXPECTING.

Researcher: probing there on strategies.... How do you manage to bridge the gap? Like you mention the ecosystem that they have theory how did you deal with that?

Miss Thwala: WHAT I DID I TOOK THEM TO THE FLOWER GARDEN HERE AT SCHOOL AND I ASK TO IDENTIFY THOSE THINGS AT HOME NOW THEY WERE ABLE TO THINK ABOUT THE VEGETABLE GARDEN WHAT IS THERE IN THE VEGETABLE ARDEN SO THAT NOW WERE ABLE TO MAKE SENSE TO DO THEM. SO ENDED UP SAYING OH WHICH MEANS..... THEY UNDERSTOOD.

Researcher: Do you link primary science to science learnt in grade 8 so that the learners can see the connection?

Miss Thwala: ITS A PITY THAT WHEN (this is a good question) GO THERE WITH THE WORK SCHEDULE.....TO GET THE BACKROUND. THESE LEARNERS ARE COMING FROM DIFFRENT PRIMARY SCHOOLS AND I HAVEN'T MET THOSE TEACHERS FROM PRIMARY SCHOOL TO KNOW WHAT THOSE LEARNERS KNOW SO IT'S A MATTER OF THE ACTIVITIES THAT I GIVE TO LEARNERS. THEY ARE THE ONES THAT MAKE ME TO BE ABLE TO DIAGNOSE THE LEVEL OF UNDERSTANDING FOR THESE LEARNERS SO THIS HOW I CAN IDENTIFY WHETHER THERE IS A LINK OR NOT OTHERWISE REALLY THIS QUESTION NEEDS TO BE MADE A FOLLOW UP ON IT BECAUSE IT COULD REALLY ASSIST IN THE TEACHING AND LEARNING OF NATURAL SCIENCE BECAUSE I'M LOOKING AT THE WORK

SCHEDULE WHAT SHOULD I FOLLOW THE ACTIVITIES ..... THAT WANT I DIAGNOSE WHERE ARE THE LEARNERS INTERMS OF THE CONCEPTS THAT IM SUPPOSE TO DEAL WITH IN GRADE 8. Probing you mean you use the baseline assessment for linking

Researcher: With regard to science learning, what do you think is lacking, when learners enter Grade 8?

Miss Thwala: UHM BASICALLY I WOULD SAY UHM THE COMMUNICATION I THINK THAT THE LEARNERS ARE UNABLE TO COMMUNICATION AND DO NOT HAVE ABILITY TO SHOW WHAT THEY ACTUALLY KNOW BUT FOR ME AS THE TEACHER I NEED TO HAVE SOME QUESTION TO FIND OUT OTHERWISE ITS NOT THAT MUCH EASIER TO IDENTIFY ITS THESE LEARNIN SKILLS OF THE LEARNERS MUST BE ABLE TO LIKE LEARNERS LOOKLIKE THEY ARE SHY THAT SHYNESS IN THEM NOW EVEN IF SOME OF THEM KNOW SOMETHIN YOU'VE GOT TO DO MANY THINGS FOR YOU TO FIND OUT WHAT IS IT THAT... ITS JUST THEY ARE LACKING TO SHOW WHO THEY ARE AND WHAT INFORMATION THEY HAVE ITS NOT EASY FOR THEM TO SHOW THE KNOWLEDGE AND SKILLS THEY HAVE SO YOU NEED TO DIG SO THAT YOU ARE ABLE TO SEE WHERE THEY ARE LACKING ACTUALLY.

Researcher: Are learners able to engage meaningfully in practical activities when they enter Grade 8?

Miss Thwala: SO TAKING INTO CONSIDERATION THAT MANY THE PEOPLE WHO THEY ARE STAYING WITH AT HOME ARE NOT EDUCATED OTHERS THEY ARE STAYING ON THEIR OWN SO MOST WORK HAS TO BE DONE AT SCHOOL WITH ME SO THAT I CAN GUIDE THEY CAN ONLY DO SOME FINISHING TOUCHES BUT HAVING GUIDED THEM....MOSTLY.

Researcher: How do you deal with the challenge of insufficient or lacking resources?

Miss Thwala:ITS REALLY A GREAT CHALLENGE BECAUSE I'VE GOT TO MINIMISE WHATEVER TASK BECAUSE I CAN'T GO AN EXTRA MILE SINCE I'M LIMITED BY THE RESOURCES SO IT'S REALLY A CHALLENGE FOR NOW. YOU ACN EVEN INVOLVE THEIR PARENTS BECAUSE OF THE ECONOMICAL STATUS OF THE ENVIRONMENT SO ITS REALLY DIFFICULT.

Researcher: Are your learners able to hypothesis and ask investigable questions from a given situation?

Miss Thwala: NO THEY HAVE NOT REACHED THAT STAGE ACTUALLY I WAS JUST PLANNING AS WE ATTEND THESE WORKSHOPS WITH MAYETHE THESE ARE THE CONCERNS I NORMALLY RAISE WITH THEM. REALLY WHEN WE TALK OF PRACTICALS WITH NO RESOURCES IT IS REALLY

NOT EASY BECAUSE THE PRACTICAL PART THAT I'VE DONE WITH THEM IS VERY LIMITEDTO REAL SEE AND PROMOTE THE PROCESS SKILLTHAT ARE REQUIRED TO BE DEVELOPED IN NATURAL SCIENCE BECAUSE WHEN I TRY TO ... THEM THEY BATTLE EVEN TO ORGANISE THE INFORMATION TO DO THE ELECTRON CONFIGARATION SIMPLE THING I BROUGHT THEM THE FIVE CENT COINS I SHOWED THEM HOW THE ELECTRONS ARE ARRANGED IN THE SHELL AROUND THE NUCLUES

Researcher: Do you know what science is taught in Grade 7?

Miss Thwala: APPARENTLY I CAN SAY NO BECAUSE WITH THIS FIELD.... EVEN MYSELF N ATURAL SCIENCE I JUST LEARNT MY ACE IN NATURAL SCIENCE IN 2008 AND 2009 WHILE I WAS DOING THE STUDIES ON NATURAL SCIENCE I WASN'T EVEN TEACHING IT I WAS TEACHING TECHNOLOGY..I FOUGHT ASKING FOR ALLOCATION I WAS NOT ALLOCATED IT ISONLY THIS YEAR 2012 THAT I'M TEACHING GRADE 8 AND 9 NATURAL SCIENCE SO I REALLY HAVE NO CLUE NOW.

Researcher: Do you think Grade7 teachers can competently teach science? Give reasons for your answer.

Miss Thwala: AH WITH THAT ONE I CAN'T JUST SAY.... BECAUSE I DON'T HAVE ANY THING TO BASE MY RESPONSE ON, BUT LOOKING ON MY EXPERIENCE BECAUSE I'VE BEEN TO PRIMARY SCHOOLS WHAT I'VE DISCOVERED THERE, THE ISSUE OF THE NUMBER OF LEARNERS AND THE LACK OF RESOURCES THIS IS WHERE THE TEACHER CAN DO AN CONCENTRATE ON AS TEACHERS WE DON'T TAKE THE EXTRA MILE TO HELP THE LEARNERS. WE LOOK AT THE CHALLENGES AND THEN WE STICK TO THEM AND THEN WE USE THEM AS THE SCAPE GOAT SAYING THERE ARE TOO MANY LEARNERS AND THERE'S NOTHING I CAN DO.... WITH ME WHAT I DID IN ANOTHER RURAL AREA SOMEWHERE WHICH IS THE PRACTICAL PART I USED TO GET THE LEARNERS AROUND THE WAY GOING HOME TO GET THE DONGA'S AND GET NATURAL CLAY AND GET OURSELVES DIRTY THERE..... SO WITH OTHER TEACHERS I CAN'T SAY IT'S THE LACK OF KNOWLEDGE MAYBE THE LACK OF COMMITTMENT BECAUSE PEOPLE DON'T WANT TO GET THEMSELVES DIRTY THEY DON'T HAVE THAT EXTRA TIME WHEN THE BELL RINGS THE SCHOOL IS OUT THEY GO OUT. SO FOR THOSE THINGS YOU NEED TO SPEAK TO THE PARENTS THAT YOU ARE TAKING THE KIDS AFTER SCHOOL YOU GO TO THE DONGA'S YOU DIG THAT CLAY YOU BRING THE CLAY TO SCHOOL THEN THE NEXT DAY YOU TRY AND MAKE THESE BALLS AND ALL THESE THINGS. SO I CAN JUST SAY ITS LACK OF COMMITTMENT MORE THAN THE SKILLS AND KNOWLEDGE.

Researcher: So what do you think about primary teachers are they competent or not?

Miss Thwala: I CAN SAY THAT THEY ARE NOT COMPETENT LOOKING AT OUR GROUP WHEN I WAS DOING NATURAL SCIENCE ACE PROGRAMME PEOPLE THAT WERE TAKEN THERE WERE THE PEOPLE TEACHING MATHS AND SCIENCE IN STD 10....

APPENDIX: O

Focus group interview 1– ZAMELISIWE HIGH FIRST GROUP

WHAT MADE YOU ENJOY SCIENCE IN GRADE 7?

L1: BECAUSE IT WAS EASY.

R: WHAT DO YOU MEAN IT WAS EASY?

L2: BECAUSE WE DID NOT HAVE THE LOT OF NOTES TO WRITE.

L4: BECAUSE WE DID NOT GET HOMEWORK EVERYDAY

ENJOYING GROUP WORK IN GRADE 7

L1: BECAUSE THERE IS ALOT OF FUN IF YOU WORK IN GROUPS.

L2: BECAUSE IT WAS NICE TO SHARE IDEAS WITH OTHER LEARNERS IN GROUPS.

L3: Because if you work IN GROUP we were not shy.

If you work alone do you become shy?

Ubanamahloni mhlawumbe uma kukhona ofuna ukubona i homework yakho.

L4: BECAUSE IF YOU DID NOT UNDERSTAND OTHERS IN THE GROUP WOULD EXPLAIN THINGS TO YOU.

ENJOYING SCIENCE IN GRADE 8

Most of you in this group said you are unsure if you enjoy science in grade 8.Why?

ANSWER: THEY said they WERE UNSURE IF THEY ENJOYED SCIENCE OR NOT.

ONE LEARNER IN THIS GROUP SAID SHE DID NOT ENJOY SCIENCE IN GRADE 8 SIMPLY BECAUSE SHE IS AFRAID OF THE TEACHER.

Probing: DOES SHE SHOUT AT YOU?

ANSWER: No (others are agreeing at the background)

PROBING: WHAT MAKES YOU SO AFRAID OF THE TEACHER? DOES SHE HIT YOU OR SHOUT AT YOU IN CLASS?

THE LEARNER DID NOT COME UP WITH THE VALID REASON WHY SHE WAS SO AFRAID OF THE TEACHER.

Why did you say you were unsure?

L3: Maam mina ngibuye ngingayizwa science.

R: Is it a hearing problem that you have that cause you not to hear or understand?

L3: No i just don't understand when she explains.

[SHE DOES NOT ENJOY SCIENCE CLAIMING THAT SHE DOES NOT UNDERSTAND THE TEACHER WHEN SHE EXPLAINS THINGS (CONCEPTS)].

L4: I AM NOT SURE WHETHER I ENJOY SCIENCE OR NOT.

R: WHAT MAKES YOU UNSURE?

L5: BECAUSE MA'AM WE HAVEN'T LEARN MUCH.

R: But you have had a whole first term learning life and living?

L1: WE LIKED IT IN GRADE 7 (she is answering the fact that they have been doing science for the past term but goes back to grade 7 science liking)

R: BUT HERE IN GRADE 8?

L3: BECAUSE, SOMETIMES SHE (THE TEACHER) Sometimes she JUST WRITES NOTES ON THE BOARD AND DOESN'T (EXPLAIN THEM AND MAYBE EXPLAIN THEM AFTER A LONG TIME.(The tone of the voice of a learner suddenly changes to show some sort of dissatisfaction)

DIFFICULTY IN GRADE 8 SCIENCE

R: DO YOU FIND GRADE 8 SCIENCE DIFFICULT?

L4: NO.

R: Why is it not difficult because you said she does not explain notes?

L1: NO MA'AM.

R: CAN YOU EXPLAIN THAT?

L1: BECAUSE MA'AM WE PASS THE TESTS THAT WE WRITE.

L2: WHEN WE ARE WRITING TESTS IT DOES NOT BECOME DIFFICULT

L4: TESTS THAT WE WRITE ARE NOT DIFFICULT.

R: EVEN THE THINGS YOU DID NOT UNDERSTAND IN CLASS YOU DON'T FIND THEM DIFFICULT IN A TEST?

Answer: IN UNISM: YES MA'AM.

PRACTICAL WORK.

R: Do you engage in practical activities? Experiments? DO you do practical work? Anything that involves working with your hands. Have you gone outside to learn about something?

L3: NO MICROSCOPE ONLY. Looked at it, learning about it

[LEARNERS HAVE NEVER BEEN INVOLVED IN PRACTICAL WORK SINCE THE BEGINNING OF THE YEAR. THEY HAVE BEEN SHOWN THE MICROSCOPE AND TOLD THE PARTS THEREOF.]

R: Have you ever used or looked through the micro scope?

Answer: Yes

R: But what were you looking at through the microscope?

Without giving verbal answer learners LOOKED AT THEIR HANDS

R: OH! JUST YOUR HANDS. Were you looking at your HANDS UNDER THE MICROSCOPE?

L: In Unisom learners said YES WE LOOKED AT OUR HANDS?

R: Is there any investigation that you have done in NS?

LEARNERS IN UNISON: Hypothesis

R: What about hypothesis? What is hypothesis?

L 2: Is the reasoning behind .....of asking the questions as scientists.

R: Have you asked those questions as scientists?

Answer: No

FOCUS GROUP INTERVIEW 4 - AMANZAMHLOPHE HIGH SCHOOL

WHAT MADE YOU ENJOY SCIENCE IN GRADE 7?

L1: I ENJOYED SCIENCE IN GRADE 7 BECAUSE WE WERE TAUGHT BY OUR PRINCIPAL MR X. HE WAS SO UNDERSTANDING HE WOULD SOMETIMES TAKE US OUTSIDE TO DO SOME.....OURSELVES. WE WOULD DO IT ON OUR OWN. (PROBING WHAT WOULD YOU DO ON YOUR OWN?) LIKE I THINK THE ASSIGNMENT WAS ABOUT PUTTING THE STONE INSIDE THE WATER AND THE WATER WOULD RISE. YOU WOULD SEE WHAT HAS HAPPENED.

L2: THE THING THAT MADE ME ENJOY SCIENCE IN GRADE 7 IS THAT OUR PRINCIPAL WAS A PERSON WHO TAUGHT US VERY WELL. HE WAS VERY UHMM... WE UNDERSTOOD HIM. (PROBING WHICH MEANS YOU LIKED THE WAY HE EXPLAINED THINGS TO YOU THAT'S WHAT YOU MEAN?) LEARNERS FROM THIS GROUP ANSWERED WITH A BIG YES.

L3: ADDING TO WHAT OTHERS HAS SAID "SOMETIMES HE WOULD MAKE JOKES TO CHEER US UP.

BL4: I ENJOYED IT BECAUSE WE LEARNEDS ABOUT NATURE WE WOULD SOMETIMES GO OUT OF THE CLASSROOM AND LEARN THERE.

BL5: HE WOULD ALSO GIVE US PRACTICAL WORK TO DO AT HOME AND WOULD TAKE US OUTSIDE TO WORK THERE. HE WOULD SIT WITH US AND HELP US.

BL6: OUR TEACHER TOOK US TO THE GARDENS TAUGHT AND SHOWED US THINGS THAT WOULD HELP US.

WHAT MADE YOU ENJOY WORKING IN GROUPS IN GRADE 7?

THE THING THAT MADE US HAPPY WHEN WE WORKED IN GROUP IS THAT EVEN THOSE WHO DO NOT KNOW WILL GET TO UNDERSTAND AS WE DISCUSS AND REMEEMBER WHEN WRITING A TEST THAT SO AND SO SAID THAT WHEN WE WERE DISCUSSING AND WHEH YOU WORK IN GROUPS YOU ARE ABLE TO SHARE IDEAS.

L2: ALTHOUGH WE WORKED IN GROUPS WE WERE NOT ALL THE SAME IN THE GROUP. OTHERS WILL JUST LISTEN TO US AND GET TO UNDERSTAND WHAT WAS BEING DISCUSSSED AND THAT HELPED US TO SEE WHAT OTHER LEARNERS THINKING

L3: EVEN THOUGH THEY WE WERE NOT SMART BUT THEY CONTRIBUTED IN THE DISCUSSIONS THEY WERE ACTIVE AND WANTED TO LEARN. THEY WERE ENCOURAGED IN GROUPS.

DO YOU WORK IN GROUP IN GRADE 8?

L4: SOMETIMES BUT MOST OF THE WE DO WORK AS INDIVIDUALS (PROBING HOW DO YOU FEEL ABOUT THAT). SOMETIMES THE WORK BECOMES SO DIFFICULT AND YOU WOULD DECIDE TO ASK A FRIEND TO HELP YOU AND DISCUSS WHAT HAS BEEN SAID OR LEARNED IN CLASS.

L2: WHEN YOU WORK ALONE YOU CANNOT SHARE YOUR IDEAS WITH ANYONE SO YOU DON'T HAVE ANY ONE TO ASSESS WHAT YOU ARE thinking or SAYING WHETHER ITS RIGHT OR WRONG OR THAT DO THEY THINK ABOUT YOUR IDEAS.

Enjoying SCIENCE IN GRADE 8.

L1: I DON'T ENJOY SCIENCE HERE IN GRADE 8 SOMETIMES I DON'T UNDERSTAND WHAT HAS BEEN SAID OR TAUGHT BECAUSE WE LEARN NEW THINGS THAT WE HAVE NEVER COME ACROSS BEFORE.

L2: YES WE USED TO LEARN IN GRADE 7 ABOUT THINGS THAT ARE AROUND US THINGS THAT WE COULD SEE AND SOMETIMES TOUCH NOT THESE ABSTRACT THINGS LIKE MOLECULES AND ATOMS. Probing it's because of new difficult science concepts that makes you not to understand your teacher or?

A big yes from all the learners.

What do you think the teacher should do to make you understand the concepts like atoms? Maybe if she could explain and show us something that would make us understand. Ma'am is not used to showing us things she just explains.

DIFFICULTY IN GRADE 8 SCIENCE (WHAT TOPICS DO YOU FIND MORE DIFFICULTY IN?)

L2: LAST TERM WAS EASY BEACAUSE WE WERE DEALING WITH THE LIFE AND LIVING WHERE WE LEARNT ABOUT THINGS THAT WE CAN SEE AND ARE FOUND EVERYWHERE AND WE KNOW THEM. THIS TERM SEEMS TO BE MORE DIFFICULT BECAUSE NOW WE TALK ABOUT THE ATOMS, WHEN WE TALK ABOUT ATOMS I DON'T KNOW WHAT ARE THEY, WHERE ARE THEY AND I DON'T SEE THEM EVERYDAY.

L3: ITS DIFFICULT THIS TERM BECAUSE MOLECULES YOU DON'T SEE THEM IT WOULD BE BETTER IF MISS WOULD SHOW US EXAMPLES OF THESE MOLECULES. THE THING THAT MAKE SCIENCE DIFFICULT IS EXAMPLES ARE NOT GIVEN (I think she meant the real objects).

HOW MUCH PRACTICAL WORK ?

L1: NO WE DON'T DO GROUP PRACTICALS WE WORK ALONE.

L2: THE PRACTICAL WORK WE HAVE DONE IS ELEMENTS WHERE WE DID SHELLS USING THE FIVE CENT COINS TO SHOW THE ELECTRON OF CARBON FOR EXAMPLE.

Did you enjoy that?

L4: YES. LET'S COMPARE NOW.

ENJOYS DOING PRACTICAL WORK RATHER THAN DOING THE WORK FROM THE BOOK.

APPENDIX: P

Teacher Name: MISS HADEBE Gender: FEMALE

Qualifications: B.Ed.

School Name: ZAMELISIZWE HIGH SCHOOL

School Category (Urban/Rural) RURAL

Grade level: EIGHT B

No of learners: 37

Learning Area: NATURAL SCIENCES

Date of observation: 04/06/2012

Topic and key concepts: LIGHT (Structure of a human eye. How do we see?)

To what extent did the teacher promote the use the development of science process skill:

Teacher Action	**Comments**
Expects learners to answer closed questions	Closed questioning is observed from the based from the previous lesson.
Expects learners to answer open-ended questions	No open ended questions were observed during the lesson.
Expects learners to observe similarities and differences	Not observed during this lesson.
The activity requires learners to record results	No activity done
The activity requires learners to do measurements	The nature of the lesson did not require any measurement.
Activity requires learners to compare and contrast	In the form of the diagram learners would compare the biconcave and biconvex lenses. No comparison or contrasting was observed.
Learners are required to record results in a variety of ways	No recording was required.
Expects learners to work independently	Learners worked independently

Expects learners to hypothesise?	Learners were not asked to hypothesise in this lesson.
Learners are encouraged to make predictions and ask ‘what if’ questions/	No what if question were encouraged

Convcave- lines bent outside

Converging lines different light rays meet in a specific point .

Bi concave – diverges different light rays moves from one specific point a separate out. The educator explains how the human eyes see. Explains the different parts of the human eye. How light travels through the eye and how the image is seen.

The teacher stands in front of the class and explain concave and convex lenses. No charts or lenses are brought to class

Teacher Name: MISS HADEBE Gender: FEMALE

Qualifications: B.Ed.

School Name: ZAMELISIZWE HIGH SCHOOL

School Category (Urban/Rural) RURAL

Grade level: EIGHT B

No of learners: 37

Learning Area: .NATURAL SCIENCES

Date of observation: 30/05/2012

Topic and key concepts: LIGHT (reflection, transmission)

To what extent did the teacher promote the use the development of science process skill:

Teacher Action	**Comments**
Expects learners to answer closed questions	Asks learners some closed questions to recap what was done the previous day. Learners are asked what transmission means.
Expects learners to answer open-ended questions	In the first ten minutes of the lesson no open ended questions were asked
Expects learners to observe similarities and differences	From educator's explanations learners are expected to say what the difference between reflection and transmission is. Taking from learner's quietness they did not get the difference very well. No observations were required.
The activity requires learners to record results	No recording was observed for this lesson.
The activity requires learners to do measurements	No measuring was observed the lesson did not cater for such process skill to be done.
Activity requires learners to compare and contrast	No comparing was required by the lesson.
Learners are required to record results in a variety of ways	The activity did not require the recording of results.

Expects learners to work independently	There was no work given in groups learners were expected to work individually.
Expects learners to hypothesise?	No hypothesising was observed during the observation of this lesson.
Learners are encouraged to make predictions and ask ‘what if’ questions/	The learners were not encouraged to make any predictions what so ever.

Educator explains different terminology to learners like reflection. Uses oral examples to explain that light in a mirror is reflected. In a glass light is passes through, it is transmitted. The educator uses the chalkboard to write the notes. The educator’s note to the researcher “My main aim for now is that they understand the meaning of different concepts under light, so that they may not be confused as we move on to more difficult concepts of light.”

Classroom Observation Schedule

Teacher Name: MISS HADEBE Gender: FEMALE

Qualifications: B.Ed.

School Name: ZAMELISIZWE HIGH SCHOOL

School Category (Urban/Rural) RURAL

Grade level: EIGHT B

No of learners:37

Learning Area: .NATURAL SCIENCES

Date of observation: 29/05/2012

Topic and key concepts: LIGHT (refraction, dispersion)

To what extent did the teacher promote the use the development of science process skill:

Teacher Action	**Comments**
Expects learners to answer closed questions	Closed question were asked. How do we know that the light has bent? What is spectrum? Recalling of colours of the rainbow.
Expects learners to answer open-ended questions	During the lesson presentation no open ended question were asked but homework activity had some open ended question.
Expects learners to observe similarities and differences	No comparing was done due to the nature of the lesson. Learners could have been given the spectrum (if available) and light source for learners to observe the dispersion of light. Limited resources could have hampered this from happening.
The activity requires learners to record results	Learners are writing from the board the notes on lights. No recording is required.

The activity requires learners to do measurements	No activity was given on this topic on during this observation that required learners to do measurements
Activity requires learners to compare and contrast	No activity given to learners that requires them to compare or contrast.
Learners are required to record results in a variety of ways	No recording observed.
Expects learners to work independently	Learners had to give examples of how the ray of light travels using examples from everyday life. The emphasis was on the fact that light travels in straight lines.
Expects learners to hypothesise?	No hypothesising was observed during this lesson presentation.
Learners are encouraged to make predictions and ask 'what if' questions/	No what if questioning encouragement was observed.

Most of the time learners copied from the chalkboard the notes and some definitions after the teacher has explained what the definitions mean.

The homework is given to learners. The content of the homework is as follows:

Investigate how are shadows formed? You can look for information in the internet using your parent's cell phones or any other physical science book that you come across.

Describe how shadows are formed?

Draw a diagram to show the refraction of white light through a prism?

Explain what you think could be the reason the length of the shadow varies during different times of the day?

Classroom Observation Schedule

Teacher Name: MISS THWALA Gender: FEMALE

Qualifications: STD, A.C.E. (Nat. Science) B.Ed.

School Name: AMANZAMHLOPHE HIGH SCHOOL

School Category (Urban/Rural) RURAL

Grade level: EIGHT VN

No of learners: 60

Learning Area: .NATURAL SCIENCES

Date of observation: 31/05/2012

Topic and key concepts: PROPERTIES OF OXYGEN

To what extent did the teacher promote the use the development of science process skill:

Teacher Action	**Comments**
Expects learners to answer closed questions	Learners answer closed questions. Is oxygen a molecule or atom?
Expects learners to answer open-ended questions	Observed open ended question. During the introduction of the lesson
Expects learners to observe similarities and differences	Expects learners to observe the differences before the element was heated after it was heated. Comparing the substances once they cooled down.
The activity requires learners to record results	Record results on the table
The activity requires learners to do measurements	No measuring is done. Variables like how much time is take to burn each element is not taken into consideration.
Activity requires learners to compare and contrast	Compares the sulphur before burning and after burning it.

Learners are required to record results in a variety of ways	Learners are recording their results on the table.
Expects learners to work independently	Yes learners work independently
Expects learners to hypothesise?	This process skill was not seen being developed throughout the lessons observed.

Educator explains the properties of the gases particularly the oxygen gas. Learner links life and living –photosynthesis to explain where oxygen come from. Educator is going to do (demonstrate) some investigations to learners then they must observe what happens and record their observations in the form of the table. Safety rules for using the chemicals were discussed like holding the test tube away from your face and others/could have been discussed before starting the demonstrations. Learners are asked to observe the colour change when the following products were burned: potassium permanganate, carbon and sulphur.

The elements were not heated to the fullest to yield the required results i.e. seeing these elements being changed and forming the product.

Classroom Observation Schedule

Teacher Name: MISS THWALA Gender: FEMALE

Qualifications: STD, A.C.E. (Nat. Science) B.Ed

School Name: AMANZAMHLOPHE HIGH SCHOOL

School Category (Urban/Rural) RURAL

Grade level: EIGHT VN

No of learners: 60

Learning Area: .NATURAL SCIENCES

Date of observation: 28/05/2012

Topic and key concepts: THE PARTICLE MODEL OF MATTER (atoms, molecules, compounds and mixtures)

To what extent did the teacher promote the use the development of science process skill:

Teacher Action	**Comments**
Expects learners to answer closed questions	Question posed is closed. What is the atom and what is molecule
Expects learners to answer open-ended questions	No open – ended questions were asked during the observation of this lesson.
Expects learners to observe similarities and differences	Comparing learners standing in couples holding each other as molecules and those standing as individuals as atoms. Comparing the molecules and atoms.
The activity requires learners to	No recording was observed because of the

record results	nature of the lesson.
The activity requires learners to do measurements	No measuring was observed because of the nature of the lesson.
Activity requires learners to compare and contrast	No question in the activity required the learners to compare and contrast
Learners are required to record results in a variety of ways	The nature of the lesson did not cater for the development of this skill.
Expects learners to work independently	Learners are working in dependently completing the worksheet.
Expects learners to hypothesise?	No hypothesising was observed due to the nature of the lesson.
Learners are encouraged to make predictions and ask ‘what if’ questions/	This process skill was not observed due to the nature of the lesson observed.

APPENDIX: Q

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