

**An examination of teaching strategies employed to improve results
in Grade 12 Physical Sciences by secondary schools in an
education district in the Eastern Cape**

Lizo Ntlanganiso

Student number: 3081714

Submitted in fulfilment of the requirements for the degree

Masters in Science Education

Science Learning Centre for Africa

Faculty of Education

University of the Western Cape

**UNIVERSITY of the
WESTERN CAPE**

Supervisor: Prof. M.S. Hartley

DECLARATION

Student number: 3081714

I declare that

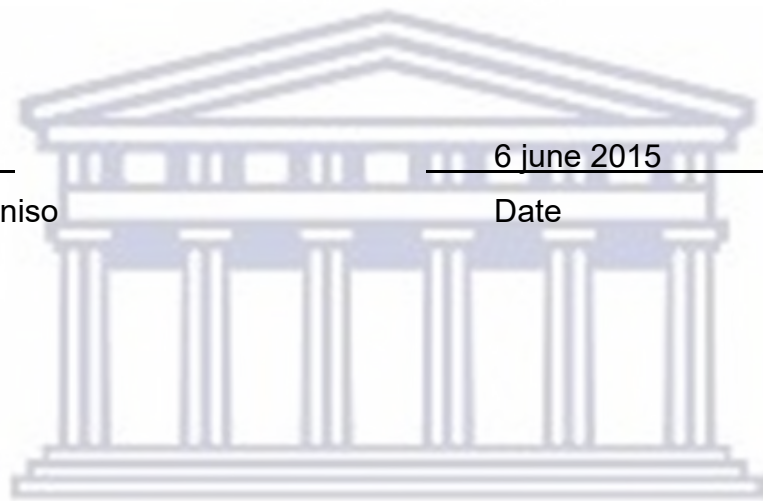
“An examination of teaching strategies employed to improve results in Grade 12 Physical Sciences by secondary schools in an education district in the Eastern Cape” is my own work, that it has not been submitted before for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged as complete references.

L Ntlanganis

Lizo Ntlanganiso

6 june 2015

Date



UNIVERSITY *of the*
WESTERN CAPE

ACKNOWLEDGEMENTS

I wish to express my sincere and heart-felt thanks to the following individuals who assisted and supported me during my research:

- Prof M.S Hartley, my supervisor, who guided, assisted and supported me throughout the study. I extend a special word of thanks to him for sharing his expertise so willingly and readily during the writing of this thesis and for ensuring that the work was submitted.
- My special gratitude goes to Prof R Chetty for sharing his expertise so willingly.
- To my family, brothers and sister, for always encouraging me when I faced those bleak moments.
- To the UWC family group (Trinset Umtata), for always encouraging us to complete the thesis early.
- To The District director, principals and my colleagues, who were willing to complete questionnaires and allowed me to do observation.
- Lastly, I thank the Almighty God for the strength and wisdom He gave me to complete this study.

ABSTRACT

An Examination of teaching strategies employed to improve results in Grade 12 Physical Sciences by secondary schools in an education district in the Eastern Cape

The purpose of this study was to examine teaching strategies employed by teachers to improve Grade 12 results in Physical Sciences. Although the national Physical Sciences pass rate has increased, critics and analysts have expressed concerns around the quality of results. The researcher compared the results of the case study with other schools within the district that have achieved both quantity and quality of results. The comparison prompted this investigation into the teaching strategies that are employed to improve the quality of results in the school. A mixed method approach was used with questionnaires, observations and interviews. Three participants were purposely selected from three schools, based on the analysis of matric results provided by the district. The sample included schools in rural to semi-rural settings in terms of socio-economic background. This study was underpinned by the theory of reflective practice. The researcher reflected on his practices, specifically on self-awareness, growth and development, to improve the quality of teaching. The evidence from the data confirmed that teachers were willing to employ different strategies to address and improve learner performance and that classroom discipline was important to ensure a supportive learning environment. A number of factors were identified as reasons to produce quality achievement of Physical Sciences in the three schools under investigation. These factors include peer assistance, mentoring of learners, learner-centred approach, variation of activities, extra lessons for learners, careful lesson planning, diverse assessment and teacher motivation.

Keywords: *teaching strategies, quality results, reflective practice, rural schools.*

TABLE OF CONTENTS

DECLARATION	2
ACKNOWLEDGEMENTS	3
TABLE OF CONTENTS	5
CHAPTER 1	7
RATIONALE FOR THE STUDY	7
1.2 BACKGROUND TO THE STUDY	7
1.3 INTERVENTIONS IN SCIENCE EDUCATION IN SOUTH AFRICA AND THE EASTERN CAPE	11
1.4 INTERVENTION PROGRAMMES TO IMPROVE POOR PERFORMANCE.....	11
1.5 RESEARCH PROBLEM	16
1.6 RESEARCH QUESTIONS	17
1.7 SIGNIFICANCE OF THE STUDY	17
1.8 LIMITATIONS OF THE STUDY	18
1.9 STRUCTURE OF THE THESIS	18
1.10 CONCLUSION	19
LITERATURE REVIEW	20
2.1 INTRODUCTION	20
2.2 DEFINITIONS OF TERMS.....	20
2.2.1 Teacher	20
2.2.3 Quality	20
2.2.4 Physical sciences	21
2.3 THEORETICAL FRAMEWORK	21
2.4 UNDER-ACHIEVEMENT IN EDUCATION.....	32
2.5 CONCLUSION	33
RESEARCH METHODOLOGY	34
3.1 INTRODUCTION	34
3.2 RESEARCH DESIGN	34
3.4 QUALITATIVE AND QUANTITATIVE RESEARCH APPROACH	35
3.4 SAMPLE.....	36
3.5 DATA COLLECTION PLAN	37
3.5.1 Pilot study	37
3.5.2 Collection of research data	37
3.6 RESEARCH INSTRUMENTS (see Appendices 1 ,2,).....	39
3.6.1 Questionnaires	39
3.6.2 Observations	41
3.6.3 Interviews.....	42
3.7 DATA ANALYSIS.....	43

3.8	VALIDITY AND RELIABILITY.....	44
3.8.1	Reliability.....	44
3.8.2	Validity.....	44
3.9	ETHICS.....	44
3.10	CONCLUSION.....	45
CHAPTER 4.....		46
RESULTS AND DISCUSSION.....		46
4.1	INTRODUCTION.....	46
4.2	SECTION 1.....	46
4.2.1	Examining learners' achievement.....	46
4.3	SECTION 2.....	48
4.4.1	Strategies employed to improve learners' results.....	55
SUMMARY AND CONCLUSION.....		74
5.1	INTRODUCTION.....	74
.....		74
5.2	OVERVIEW OF THE SCOPE OF THE THESIS.....	74
5.2.1	Introduction.....	74
5.2.2	Literature Review.....	75
5.2.3	Methodology.....	75
5.2.4	Results and Discussion.....	75
5.3	MAJOR FINDINGS OF THE STUDY.....	76
5.4	IMPLICATION OF THE STUDY.....	78
5.5	LIMITATIONS OF THE STUDY.....	79
5.6	RECOMMENDATIONS.....	79

List of tables

Table 1: NSC Physical Sciences results for the researcher's school.	7
Table 2: NCS Grade 12 Physical Sciences results National, Provincial and District.	8
Table 3: Intervention programmes to improve poor performance	12
Table 4: Result of sampled schools for three consecutive years	36
Table 5: Outlined plan to carry out the study	38
Table 6: Grade 12 physical sciences pass percentages and levels	47
Table 7: Data from the respondents	49
Table 8: Provision of rating scale information	51
Table 9: extra class lesson offered in school	53

List of Figures

Figure A: Respondents' responses from Questionnaires	52
--	----

CHAPTER 1

RATIONALE FOR THE STUDY

1.1 INTRODUCTION

This chapter provides the rationale for the study. It presents the background and context to the study. It highlights the research problem and provides the research questions that must be answered to address the research problem. The significance and limitations of the study are also specified.

1.2 BACKGROUND TO THE STUDY

The researcher began teaching Grade 12 Physical Sciences in 2009. The school I am teaching at is a no-fee school (a school where learners do not pay fees) situated in Ntabethemba circuit in Cradock district in the Eastern Cape. The school is situated in a disadvantaged community and has no laboratory to teach Physical Sciences. According to the Eastern Cape Examination Report (2016) Physical Sciences results in the country and the school had improved over the past six years. Table 1 below presents the results over this period.

Table 1: NSC Physical Sciences results for the researcher's school.

Year	School results
2009	0
2010	45
2011	58
2012	85
2013	100
2014	100
2015	27
2016	100
2017	100

Physical sciences and the entire results of the school demonstrated a huge improvement in term of the pass rate, according to Table 1, despite the fact that the results in 2015 displayed dramatic decline because of many challenges, which

included the shortage of teachers in certain subjects. These subjects were left without teachers due a movement of teachers and the reduction of the staff establishment. Hence, the school had to look for alternative ways to teach learners. The alternatives implemented had a serious impact on Physical Sciences and other subjects. Physical Sciences require more time to cover the syllabus; therefore, the researcher was unable to offer extra lessons, hence the decline.

Although there has been growth in the national Physical Sciences pass rate for the past five years, the quality of the passes obtained by learners was still relatively low. The statements released by the Minister of Education in South Africa pointed-out that there was marginal improvement in the results (National Senior Examination Examination, 2016). Table 2 below illustrates the claims made by the minister.

Table 2: NCS Grade 12 Physical Sciences results National, Provincial and District.

Year	National	Provincial	District
2010	47.8	43.3	49,5
2011	53.4	46.	52,4
2012	61.5	50.5	61,9
2013	56.5	55.8	70,7
2014	61.5	51.5	77,7
2015	56.5	49.5	63,0
2016	62	49.6	81
2017	65	57	63,3

The Physical Sciences results in the district displayed an increasing trend in terms of percentage performance for the past 5 years until a huge decline of 14.7% in 2015 (National Senior Certificate School subject report, 2017). The district has been appraised number one in terms of percentage compared to other districts in the Eastern Cape. Moreover, in 2014 the results were 77.7% compared to the huge decline in 2015 (Schools Subject Report Eastern Cape, 2014). I noticed that as much as the pass rate of the Physical Sciences in the district and in the school increased successively, there was a lack of improvement in the quality of passes. Quality of passes means learners who are getting a pass level that would allow them to be admitted to bachelor's degree in science-related studies. The school had managed to get 100% pass rate successively in Physical Sciences. Comparing the school with

other schools in the district that have been getting both quantity and quality of pass rate at the same time, prompted the researcher to investigate the strategies that these schools use to achieve quality results.

A study by Makgato & Mji (2006) observed that a number of researchers established that the quality of teaching of mathematics and Physical Sciences in schools was poor. As such, the numbers of learners taking mathematics is also affected. An analysis of Grade 12 matriculation results exposes that Physical Sciences and mathematics marks are always low (Fricke, Horak, Meyer & Van Lingen, 2008). Hence, the researcher saw a necessity to reflect on his teaching strategies for a solution. Taking into consideration the study of Makgato and Mji, which focused on contributing factors to poor performance and poor quality of Physical Sciences results at grade 12, it evoked the need to examine the teaching strategies employed by teachers.

The Centre for Development and Education (CDE) (2004) made claims that the number of learners who matriculate with Mathematics and Sciences on higher grade level is very low in South Africa, to the extent that only a limited number of students graduate in the Sciences. This has resulted in a situation whereby South Africa has had to resort to foreign skilled workers to help build the economy. Furthermore, the study came at the right time to examine possible solutions to better the quality achievement of both Mathematics and Physical Sciences results in schools, provinces as well as the country as a whole. In addition, many learners taking Mathematics and Sciences would be beneficial to the economy of the country. Motivation must be encouraged to increase the number of learners who are taking these subjects at further education training (FET) phase to address the problem of outsourcing many foreign teachers in the subjects.

The researcher highlighted the importance of and gave an overview about the state of Science education in South Africa. The main aim was to afford a realistic overview of the quality of achievement of education in South Africa especially in Sciences; To identify the improvements since the transition to democracy and, in doing so, comment on the state of the country's education systems. The researcher trusts that the transformation in education was implemented to better the quality and to improve the standard of education in the country.

The report issued by Centre for Development and Enterprise (CDE, 2013) claims that it became increasingly clear that the weight of evidence supports the conclusion that there is an on-going crisis in South African education, and that the current system is failing the majority of South Africa's youth. By using a variety of independently conducted assessments of pupil achievement the report shows that, with the exception of a wealthy minority, most South African pupils cannot read, write and compute at grade-appropriate levels, with large proportions being functionally illiterate and innumerate. Therefore, the researcher found it vitally important to find teaching strategies that can assist learners to improve the quality of Physical Sciences results in the school despite the claims that only those that have wealth succeed better in these subjects.

CDE (2013) further pointed out that as far as educational outcomes are concerned, South Africa has the worse education system of all middle-income countries that participate in the cross-national assessment of educational achievement. What is more, we perform worse than many low-income African countries. The annually reported statistics from the National Senior Certificate (NSC) examination in Grade 12 are particularly misleading since they do not take into account those pupils who never make it to Grade 12. Of 100 pupils that start school, only 50 will make it to grade 12, 40 will pass, and only 12 will qualify for university. Those 18-24 years who do not acquire some form of post-secondary qualifications are at a distinct economic disadvantage and not only struggle to find full-time employment, but also have the highest probability of being unemployed for sustained periods of time, if not permanently. The researcher shares the same sentiment with CDE with regard to the claims that the Department of Basic Education mislead the public in terms of results in South Africa. The Department is not concerned about what is happening in other grades, rather only in what happens at Grade 12. Not much support is given to other grades except grade 12, so that the system may look good or successful...The majority of learners, once they reach grade 10 or 11, drop out because they do not cope with the amount of work given in those grades. The DBE is not doing much about those learners, yet they become part of the economy of the country and the economy of the country is compromised in this way.

The CDE (2013) criticized the recent claims that there were improvements in pupils' outcomes, as well as some important policy innovations. The picture that emerges,

time and again, is both dire and consistent. However, when one chooses to measure learner performance, and no matter which grade one chooses to test, the vast majority of South African pupils are significantly below where they should be in terms of curriculum. More generally, they have not reached a host of normal numeracy and literacy milestones. As it stands, the South African education system is grossly inefficient, severely underperforming and egregiously unfair. This indicates the crisis the Department of Basic Education in South Africa should be focusing on, rather than focusing on the output (FET) phase. For example, the monitoring and support are always given at FET level, especially at Grade 12. Moderations are seldom done at the foundation and senior phase.

1.3 INTERVENTIONS IN SCIENCE EDUCATION IN SOUTH AFRICA AND THE EASTERN CAPE

According to the PMG, (Group, 2011) (2011), the Department of Basic Education (DBE) of South Africa, the Department of Higher Education and Training (DHET) and the Department of Sciences and Technology (DST) provided intervention strategies plans to address and support the participation and performance of learners and students throughout the education systems in Mathematics and Sciences. Although this was done, it did not accommodate every school or every teacher but focused on certain schools or teachers that have shown poor performance in Physical Sciences and Mathematics.

1.4 INTERVENTION PROGRAMMES TO IMPROVE POOR PERFORMANCE

Due to the major challenge faced by the South African education of not producing anticipated results in Grade 12 learners, the DoE introduced intervention programmes with the aim of giving support to teachers in order to contribute effectively in the teaching and learning by Education Information Standards (2010). These intervention programmes did not have much impact because of limitations due to funding, lack of proper planning and difficulty to provide for the Eastern Cape as it has the largest number of schools by Parliamentary Monitoring Group PMG (2012). Table 3 below shows interventions programmes with their limitations.

Table 3: Intervention programmes to improve poor performance

Intervention Programme	Limitation
1. Dinaledi Project	In order to be part of the project, schools must have registered a minimum of 50 learners in mathematics and Physical Sciences or the school must have obtained a minimum of 50% in both mathematics and Physical Sciences. The project also caters for 60 schools per provinces. These requirements prevent other schools from having an opportunity of being part of this project.
2. Incubation classes.	These classes accommodated a maximum of ten learners per school and learners were selected according to their performance. They were only for learners who are performing well in both mathematics and Physical Sciences.
3. Winter and spring schools.	Classes are overcrowded with little or no individual attention. Educators rush to cover all the challenging topics over a short period of time, leaving behind most learners. Not all learners are able to attend those science festivals.
4. Science festivals usually held in Grahamstown	Parents have to arrange payment for their children to attend festivals. Eastern Cape is one of the provinces with high rate of poverty, and it is difficult for some parents to provide for their children to attend these festivals. Most schools do not show any interest in motivating learners
6. Science Olympiads, SAASTA science debate, Eskom Expo, science weeks	Most educators do not show interest in motivating their learners to attend these programmes. In most cases, it is the schools that are already performing that are showing interest in such programmes.

<p>7. NMMU Skills Development Programme for FET mathematics and physical sciences educators</p>	<p>This programme caters for a limited number of educators. There are about 6500 educators in Eastern Cape province, mostly in rural areas, and this makes it difficult for the Department to reach out to every educator.</p> <p>Only a limited number of educators was accommodated in the programme due to funding. Not all learning areas were covered because of the short period and lack of funds.</p>
<p>8. Short course for grade 9 natural science educators offered by UWC 9. UWC programme for Physical Sciences educators</p>	<p>A maximum of 50 educators was taken into the programme from ACE; they are currently doing Masters in Science Education. It is not easy for these educators to conduct workshops for other educators in their districts because there is not money in the Eastern Cape Department of Education to support these educators to facilitate workshops in their respective districts.</p>

The researcher had an opportunity to develop Physical Science content knowledge by being enrolled with the University of the Western Cape to do the Advance Certificate in Education (ACE) in Sciences. This opportunity was granted through the Department of the Eastern Cape. However, only a limited number of teachers were given the opportunity. The content knowledge offered in the course was mainly for Grade 12. The course was designed to improve the content and knowledge of the subject teachers and the use of possible resources to enhance teaching in the classroom.

Of other intervention programmes DBE initiated, only a small number of schools and teachers in Mathematics and sciences benefited, and the DBE focused its presentation on the Dinaledi school project. According to CDE (2013), there were areas of development DBE focused on: learners, teachers, development of learning environment, and teacher education. Furthermore, a summary of report issued by DBE task team in 2011 notes that the school's performance was analysed and were categorized so that targeted interventions could be done. The World Bank's study showed that the Dinaledi schools project yielded noticeably improved enrolment and performance results in Physical Science, but that better results could have been achieved by redirecting some resources. The researcher commends these intervention programmes; nevertheless, wishes to see these interventions cascaded towards intermediate and foundation phase.

The DBE had also developed an “action plan 2014” to improve results generally by 2025. The curriculum was being improved so teachers knew what content to teach, and when to teach it, and the integration across subject areas of Mathematics and Sciences elements was taken into account. Although this intervention has been done, my school is not part of the Dinaledi schools, and the school struggles in attaining the aim of the majority of learners to gain a university entrance in Mathematics and Physical Sciences. The majority manages to pass Physical Sciences but fails to achieve quality results.

The second intervention conducted by the Department of Basic Education (DBE) was the Annual National Assessments (ANAs). These nationally standardized tests of achievement for grades one, six and nine, constitute a most important policy development in the past ten years. In principle, they provide some standardized indication of learning at the primary grades, allowing for the early identification and remediation of learning deficits.

Moreover, the available evidence indicates that the vast majority of pupils in South Africa are seriously underperforming relative to the curriculum. The 2012 ANAs indicated impossibly large increases for the foundation phase (a year-on-year increase of 49 percentage points in the case of grade three literacy) and have subsequently come under considerable critique by academics across the country. While these tests are important in improving the quality of education in South Africa, their current implementation and lack of external verification reduces much of their value. The Department of Basic Education and training easily identifies the problem but fails to provide necessary help at these grade levels as compared to Grade 12. The researcher believes we should have programmes like Dinaledi Schools in the intermediate and foundation phases to improve the crisis of results we see in ANA.

Kriek and Grayson (2009) highlight that many groups and organizations, from NGOs to businesses, to provincial education officials, to student volunteers, have tried to improve the state of mathematics and science through a variety of interventions. Unfortunately, most interventions were short-term, often only once-off, and have no theoretical foundation. Many initiatives, such as Saturday schools, focus on helping learners pass the senior certificate examinations. While these initiatives may help

some individuals, they do not improve the education system. These claims show that the department is not looking at permanent solutions rather expecting a quick fix. These interventions must be undertaken and coupled with long term goals to better the system of education in the country.

To put more emphasis on the claims, Kriek and Grayson (2009) concur with Kahle (1999:2), who says, “Schools are only as good as their teachers. Regardless of how high their standards, how up-to-date their technology, or how innovative their programs, long term, sustainable improvement of mathematics and sciences education must therefore focus on strengthening teachers”. Much has been done to capacitate teachers in terms of content gaps but there continues to be a decline in quality results for mathematics and Physical Sciences. The results of Physical Sciences in the researcher’s school have improved in terms of the number of learners who are obtaining above minimum passes; however, the majority do not to get quality results. Based on the claims that schools are as good as their teachers, the researcher had to reflect on his teaching.

The Department of Education in the Eastern Cape has done a lot to support teachers and learners. A number of strategies has been implemented in support of Mathematics and Physical Sciences teachers. In 2010 the ECDoE selected 50 teachers in Sciences to be capacitated in Physical sciences with the Advance Certificate of Education (ACE). This intervention was meant to equip and capacitate educators in term of content gaps and best practices to be shared amongst teachers in the province.

The acting Head of Department of the Eastern Cape Education Department, Prof RH Nengwenkulu, pronounced that teaching, learning and assessment constitute the core business of the Department of Education, hence the main mandate is to provide for the planning, coordination, monitoring, evaluation and support for implementation of curriculum policies. This is achieved through the professional development of curriculum advisors and teachers, supported by e-learning, media centres, curriculum information services, Mathematics/Science/Technology education, and assessment and examinations. The ECDoE has rolled out a programme in assisting Mathematics and Physical Sciences teachers with content knowledge and training teachers in how to use a computer to benefit learners. Fortunately, the researcher’s school had already had a few computers loaded with educational software for teaching and learning

programs. However, effective use of the computers had challenges because of limited time during school hours.

1.5 RESEARCH PROBLEM

The analysis of grade 12 Physical Sciences results from Cradock district in the Eastern Cape pointed to the percentage increase in performance quantitatively. However, quality achievement of passes decreased through the years. Physical Sciences results have been improving in quantity but lack of quality achievement of passes has raised concerns of the researcher. I believe that there should be an increase in the quality, even if the number of passes remained unchanged or increased for the past few years. This could be caused by many factors inside and outside the classroom which play a role in poor quality achievement presented in the Grade 12 Physical Sciences results. There are many reasons for learners' poor quality attainment in Physical Sciences performances at Grade 12: These reasons include:

- lack of supportive home environments,
- poor management by principal and local education authorities,
- inadequate facilities in schools (including the lack of libraries),
- inappropriate didactic approaches by teachers (such as absence of meaningful classroom interaction between teachers and learners) and
- the unavailability of necessary learning materials.

The researcher believes that the schools have textbooks to carry out the syllabus but lack facilities like a laboratory; however, certain schools with a similar background performed better than the researcher's school.

Poor quality attainment in Physical Sciences results at Grade 12 in South Africa can be attributed to many factors. Mkhombo (2006) indicated that there are basic causes for poor performance of black Grade 12 learners; he cites the following causal factors as critical:

- lack of resources such as libraries and laboratories,
- irrelevant textbooks and,
- lack of infrastructure such as toilets and classrooms.

These are often multiplied by a shortage of suitably qualified educators, badly trained and under-qualified educators and lack of learner and educator discipline. Although causal factors have been noted, the researcher found it strange to see schools with similar background as the researcher in term of infrastructure achieving better quality results. Even though there has been this reported increase in Physical Science national pass rates, critics and analysts have been expressing concerns about the quality of these results. Comparing the quality of results of the researcher's school with other schools in the district that have been getting both quantity and quality pass rates at the same time, prompted me to investigate the teaching strategies used by other Physical Sciences teachers to produce quality results. Physical Science is viewed as one of the subjects that can contribute to the alleviation of skills shortage in our country. This lack of quality of passes in Physical Sciences has led to a small number of university enrolments in Science, Engineering and Technology based careers. This has serious implications for South Africa's economic growth which is in need of qualified engineers and scientists. Granville Whittle (2011) said that they are "obviously very concerned about the quality of passes in the gateway subjects" such as Mathematics, Physical Sciences and Accounting.

1.6 RESEARCH QUESTIONS

In order to address the research problem, the following main research question was answered:

What were the teaching strategies employed by schools to improve the quality of passes in Physical Sciences?

The main research questions was addressed through the following sub-questions:

- *What were the teaching strategies employed by the Physical Sciences teachers in the three schools sampled from the education district? t*
- *What were the teachers' perceptions of the teaching strategies used in their Physical Science lessons?*

1.7 SIGNIFICANCE OF THE STUDY

Firstly, this study presented insight regarding strategies used in a classroom in order to obtain quality results at Grade 12. Secondly, the study also highlighted the importance of using different strategies. Thirdly, the results of this research could be beneficial to previous disadvantaged schools, especially those schools that have not

been obtaining quality results in grade 12. Fourthly, this research could provide important additional commentary on the role of teaching strategies in improving the quality of results in Physical Sciences. Finally, this research may provide the foundation for further research into teaching strategies that may produce quality results at Grade 12 level in South African schools.

1.8 LIMITATIONS OF THE STUDY

According to Chokwe and Lephalala (2011), limitations are those things the researcher cannot control, but that may have influenced the results of the study. These may not be faults caused by the weakness of the researcher. Instead, they could be those factors that are unable to be managed by the researcher that may affect the acceptability of the research data.

The following aspects limited the study:

Only schools in Eastern Cape Department of the Eastern Cape (ECDoE) of Cradock district are represented and form part of this study;

- English was the medium used in the questionnaires and during observations, which may have limited the collection and interpretation of valuable data; and
- Voluntary participation of educators could have had an influence on the reliability of the information.

1.9 STRUCTURE OF THE THESIS

Chapter One introduces the background to the study, motivation for the study, and states the aims, purpose, significance and research questions. It also deals with the research methodology, limitations of the study and summary of the chapter.

Chapter Two provides a literature overview on teaching strategies. Chapter two also sets out to provide literature on factors that might impact on the successful implementation of teaching and learning strategies. It concludes with the theoretical framework that the study is based on.

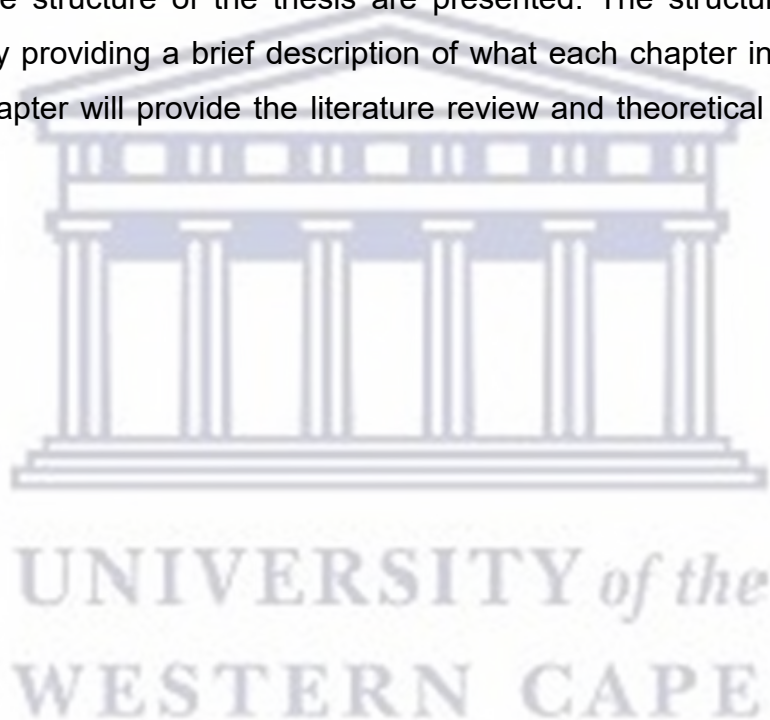
Chapter Three restates the main aims and objectives of the research. It explains the research design and the research methodology employed. The research participants and the analysis of the data are discussed. The chapter concludes with the ethical considerations applied in the study.

Chapter Four presents the research findings and provides an analysis and discussion of the data collected.

Chapter Five presents a summary, conclusions, implications and recommendations for future study

1.10 CONCLUSION

This chapter provided the rationale for the research problem by relating the background and setting in which the study was conducted. It also outlined the research problem and its research question. Leading to the research question, the research problem is unpacked and explained. The significance, limitations of the study and outline of the structure of the thesis are presented. The structure of the thesis is presented by providing a brief description of what each chapter in the study entails. The next chapter will provide the literature review and theoretical framework for the study.



CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

The focus of this chapter is to provide the theoretical basis of the study. It provides clarification of the terms used in the title and presents the theoretical framework that underpins the study. The chapter considers relevant studies that have an impact on the research question and sub-questions namely,

What were the teaching strategies employed by schools to improve the quality of passes in physical sciences?

- What were the strategies employed by the three sample teachers in their physical science lessons?
- What are the teachers' perceptions of the strategies used in their Physical Science lessons?

2.2 DEFINITIONS OF TERMS

In this section study terms are defined.

2.2.1 Teacher

Teacher is a person, specially an educator, principal or other person, involved in teaching and learning by imparting knowledge to another person to produce educational results.

2.2.2 Teaching strategies

Jacobs, Gawe and Vakalisa (2000:210) defines a teaching strategy as a particular technique a teacher uses to help learners gain the knowledge which they need to achieve a desired outcome.

2.2.3 Quality

According to Brewster, Carey, Dowling, Grobler, Holland and Warrnich (2003:129), quality has been defined variously as the value, conformance to specification, conformance to requirements, meeting or exceeding standards that must be met to achieve a specified purpose.

2.2.4 Physical sciences

According to the Department of Education (2003), Physical Sciences focuses on investigating physical and chemical phenomena through scientific inquiry. By applying scientific models, theories and laws it seeks to explain and predict events in our physical environment.

2.3 THEORETICAL FRAMEWORK

This study is placed within the theory of reflective practice (Moon, 2000). Reflection is the practice of thinking analytically about an experience or an activity. It is shaped by a feeling and awareness that may be understood (Polanyi, 2004), rather than known and accepted. Reflective practice is viewed as a means by which practitioners can develop a greater level of self-awareness about the nature and impact of their performance, an awareness that creates opportunities for professional growth and development (Osterman & Kottkamp, 1993). According to Greenwood (1993) reflection is when a practitioner considers what he/she is doing, whilst busy doing it. He further suggests that the consideration can be stimulated by surprise. On the other hand, Patil (2013) views reflective practices as means by which one engages in a process of on-going learning and developmental awareness whilst paying attention to the practical values and theories. He sees it as an instrument that practitioners may utilize to gauge their professional development and improvement and their practice based professional learning. This is consistent with Osterman and Kottkamp (1993), who define reflective practice as a means by which educators can develop a deeper level of self-awareness about the nature and impact of their performance, awareness that creates opportunities for professional growth and development.

Osterman and Kottkamp (1993) argue that reflective practices create an opportunity for the teacher to develop a greater level of self-awareness about the nature and impact of their performances, an awareness that creates opportunity for growth and development. The researcher often reflected in the middle of the teaching to make adjustments; furthermore, the researcher needed to reflect on teaching strategies

administered for self-awareness, development and growth to improve the quality of Physical Sciences results in the school.

Reflection is a necessary component to becoming a scholarly teacher and a “reflective practitioner”, engaged in continuous self-directed development and capable of making informed decisions about approaches to learning and teaching within particular disciplinary and academic contexts (Schon, 1983). The researcher seeks to discover strategies used by other teachers in the same environment that are able to produce quality results in the school through reflecting on strategies he employs. Most important, reflection helps us to develop our own learning and teaching framework (Brookfield, 1995). The researcher finds it more important to look back to his teachings and look for other alternative ways of teaching the researcher might not have applied. Kolb & Fry (1975) suggest that concrete experience and reflective observation are also critical stages of the experiential learning cycle. Therefore, classroom reflection will be at the forefront in investigating the strategies to be implemented in a diverse Physical Sciences classroom. The researcher has an assumption that there are many important ways to deliver lessons to better the quality of results of Physical Sciences.

According to Jacobs (2013), suggested that a repository of reflection tools, after making claims that reflective teaching should raise the teacher’s awareness as its primary objective, implying that teachers should be aware of their shortcomings, since most teachers cannot realistically and objectively pinpoint their own weaknesses. In order teachers to raise their awareness, they must employ the tools and techniques suggested below.

- They must engage fellow colleagues, and form reflective partnerships where they observe and critique each other constructively.
- Foster a spirit of collegiality where they embark of reflection as group.
- Take videos of their lessons and view themselves in action.
- Arrange for colleagues to visit their classes and observe their teaching.
- Formulate or use the schools’ assessment or observation forms to evaluate their teaching.
- Allow learners to complete subject or teacher evaluation forms, in order to gain information about the views of their learners with regard to their teaching.

- Teachers should assume the role of *teacher as researcher* and embark on action research in their classrooms.

The researcher is of the opinion that it is important for teachers to be conscious about the personalities and ways of individual learners and of the entire environment that affects learners, to select educative experiences that nurture and sustain reflective thought. Our assumption is that “more reflective teacher actions will lead to greater benefits for the teacher and for all of his or her pupils” (Zeichner & Liston, 1987, p. 25). In addition, the researcher, to be able to work more effectively and produce quality results in Physical Sciences, needs to self-evaluate every lesson delivered. Reflection practice will enable the researcher to accommodate learners to understand Physical Sciences. Therefore, there is also a need for the researcher to look into his teaching strategies administered and be able to learn and compare his strategies with those of other teachers to improve the quality of results in the school. Dewey (1933) believed that thinking was natural but that reflective habits of the mind needed to be taught. The researcher needed to reflect to the nature and the of the lesson he delivered and presented.

Studies that examined the effects of specific interventions on the quality of reflective thinking in journal include Stalhut and Hawkes (1997) compared the effects of different media (written journals, telecommunications, and personal conferences) on reflection. They found preservice teachers tended to reflect on issues of personal self-worth and professional performance and that they used each medium for different purposes. Loughran (1997) investigated how his own modelling of reflection through thinking aloud and journal sharing affect student teachers' reflection. He found that these strategies helped preservice teachers to understand the process better. That will enable the researcher to reflect upon his teaching and copy good practices used by other teachers, moreover, only those strategies that he thinks might benefit learners to improve the quality of their results.

What is unique about the teaching process is that it requires teachers to transform their subject matter knowledge for the purpose of teaching (Shulman, 1986). This transformation occurs as the teacher critically reflects and interprets the subject matter; finds multiple ways to represent the information as analogies, metaphors, examples,

problem, demonstrations and classroom activities; adapts the material to learners' abilities, gender, prior knowledge and misconceptions and finally tailors the material to those specific learners to whom the information will be taught. Moreover, it is not surprising, then, that reflection continually emerges as a suggested way of helping practitioners better understand what they know and do as they develop their knowledge of practice through considering what they learn. Reflection, then, places an emphasis on learning, through questioning and investigation, to lead to a development of understanding (Smyth, 1992).

In the field of teacher education, waves of reflective practice washed over the profession following Schon's (1983, 1987, 1992) reminders of the importance of the link between reflection and practice. Then Brookfield (1995) reminded us that the reflective practice literature is important for two reasons. First, it offers a variety of approaches to examining practices in order that we might discover and research the taken-for-granted assumptions that influence our approaches to practice we can learn about, and start experimenting with different approaches to teaching. The researcher has assumed that there are possible teaching strategies that lead to quality of passes. In this case then teacher has demonstrated the value in questioning his taken-for granted assumptions of practices.

Reflective practice is associated with learning from experience, and it is seen as a significant strategy for professionals who embrace life-long learning. This shows that reflective practice can be associated with social and critical theoretical frameworks because learning is acquired through experience. Reflective practice carries different meanings that range from the idea of professionals engaging in solitary introspection to that of engaging in critical dialogue with others. Reflective practice is defined as the process of learning through experience and learning from experience towards gaining new insights of self or of practice (Boud et al., 1985; Boyd and Fales, 1983; Mezirow, 1981; Jarvis, 1992).

I have used different teaching strategies in classroom, but struggle to improve the quality of results. Every quarter the subject advisor in the district visits the school to observe classroom teaching practices. Feedback and criticism will be given. I always try to improve on strategies I use in the classroom based on the advice and knowledge received. This kind of learning enables teachers to make the biggest leap from theory

to accomplished practice. In addition to a powerful base of theoretical knowledge, such learning requires settings that support teacher inquiry and collaboration strategies grounded in teachers' questions and concerns (Darling-Hammond & McLaughlin, 1995, p 598).

Reflective practice can be more effective if it leads the teacher to make meaning from the situation in ways that enhance understanding so that she or he comes to see and understand the practice setting from a variety of viewpoints. Such learning can then impact on the development of one's attitudes for reflection (Dewey 1933). Quinlan and Akerlund's (2000) study reveals the importance reflection as the effective cross-disciplinary reviews that occur in peer review of teaching and peer observation of teaching. Learning processes require both teacher and learner to forge sound relations that will promote effective teaching, and learning to drive away all negative attitudes.

The lack of quality of education that learners receive at public schools is a major contributing factor to poor quality results (Sagor & Barnett, 1994). The researcher sees a need for teachers to use teaching techniques that are effective. Effective science teaching strategies ensures that learners are actively constructing their learning. Teachers must be aware of effective techniques so as to adapt available curriculum materials and teaching strategies to fit the diverse needs of all students. Effective instructional leadership requires the application of an education model appropriate to the current teaching and learning. Listening to the educator, reading from the text, and answering worksheets or questions is no longer an appropriate or effective way to reach all learners. Many learners need hands-on experience in which they can engage, discuss, manipulate and question the content being studied (Lemahieu, Roy and Foss, 1997: 594)

In Portugal, studies conducted in schools that had confronted and reduced failure rates highlight the importance of variables such as (a) school organization, including a collaborative environment with parental involvement; (b) relevant curriculum and classroom activities; and (c) the quality of science teaching, including teacher support and expectancies (Fonseca, 2003). This demonstrates a need for teachers to reflect effectively on their teaching and possibly look for strategies that can be used to produce quality results.

The learners' daily life terminology is different from the scientific terminology; some learners therefore find it hard to study chemistry as stated by Sendur, et al. (2010) and Erdmir, et al. (2000). This demonstrates a lead to educators to find better ways that would bring solution and change in the learners' thinking science concepts.

Donald Schon (1987) has been fundamental to understanding the nature of reflective practice. He also made identification of technical rationality as the schools' prevailing epistemology. He considered technical rationality inadequate for solving the complex problems of education practice and proposed that "professional education should be redesigned to combine the teaching of applied sciences with coaching in the artistry of reflection- in – action ". However, past experiences have prompted the researcher to reflect on his teaching strategies and to conduct a study that would assist in finding solutions to the problem.

According to Tucker, Strong, & Gareis, (2002), reflection provides teachers an opportunity to self-evaluate their teaching and practices. The researcher believes that teachers who think or reflect on their teaching techniques and seek to find what needs to improve the lesson taught, allows for growth in the profession. Since the quality of results in the school is not getting any better but quantity is getting better each year, the researcher needs to discover better teaching strategies or find additional ways to improve the quality of results. Through reflective practice and a reflection framework, better ways are found for the researcher to do self-evaluation. Over a period of time, a teacher is able to see his/ her growth through a reflective portfolio. (York-Barr, et al., 2001). A Reflective portfolio plays an important role in enabling the researcher to think deeply and write about learning experiences.

Reflective practice is a vehicle for change and there are several ways to achieve this (Fullan, 2005). It is only through this practice that teachers experience growth (York-Barr, Sommers, Ghore, & Montie, 2001). The group participants plan the lesson together, observe each other, and provide feedback about teaching and learning. In this study group models, teachers put theory into practice by being able look at what other teachers doing in their classrooms. This is identified as reflection-for-action (Killion and Todnem, 1991) and reflection- on- action (Schon, 1983).

Reflection-for-action occurs when the teacher researches, discusses and creates action steps for the new strategies for the purpose of professional growth and positive learner outcome or quality of result. Schon (1998, 2011) defines reflection as a way of bridging the gap between theory and practice. Schon argues that reflection-in-action occurs during the experiences when the individual engaging in the process draws on his/her existing knowledge to solve the problem in that situation. He also acknowledges that reflection-on-action occurs after the event, as a way to engage in the process of continual learning. Reflection- in- action is thought to be a more sophisticated skill while reflection- on- action is common amongst learners and beginning practitioners.

Daily life activities are the source of reflection that contributes to the development of the intellect and permits human beings to live and act together; human beings learn from the experiences, mistakes and successes of others (Nakieski, 2005, Taylor, 2010). This study is foregrounded on this framework to assist the researcher to continue developing and be able to assist learners of physical sciences in the school to achieve greater quality of results.

In the 1930s Dewey defined reflection as a way of thinking up until 1998 where Schon (1998) came up with the reflective practice as an essential component of professional action. Taylor (2010) explains that reflective practice involves deep internal thought process, making sense of events, experiences and relationships with others and assisting in orientating us towards our personal goals. The argument above highlights the importance of practising reflection to gain personal growth and be able to assist learners in the classroom.

Rainer (1978) agrees with Schon that to make connections to what was not noticed before in the classroom, reflective practice has a way of bringing about examination of the intellect especially when one takes steps back. The researcher felt the importance to reflect will play a pivotal role in the development and achievement of quality of results in Physical Sciences. Furthermore, not only learners in the classroom benefit but the researcher grows intellectually.

Reflective teaching is an important approach towards teaching, which requires teachers to think of and gather data about their classroom actions, reflect on them, act on them, observe the results and finally improve their teaching, which will in turn assist

them in developing themselves professionally. Teachers can become reflective practitioners through involving themselves in a variety of different activities such as keeping teaching journals and portfolios, writing reports, conducting classroom observations, forming reflection inquiry groups undertaking research, and a number of other reflective activities that raise teacher-awareness of their own practice.

Qing (2009) points out that by reflecting on their experiences, teachers can have a better understanding of teaching as well as their own practice. Moreover, reflection raises teachers' awareness of themselves, their strengths, and their weakness, and consequently help them to develop their own practice. (Pollard, Anderson, Maddock, Swaffield, Warin and Warwick, 2008).

According to Greenwood (2003), reflection is when the practitioner considers what he is doing, whilst busy doing it. He further suggests that the consideration can be stimulated by surprise. On the other hand, Patil (2013) views reflective practices as means to which one engages in a process of on-going learning and developmental awareness whilst paying attention to the practical values and theories. He sees it as an instrument that practitioners may utilize to gauge their professional development and improvement; and their practice based professional learning. This is consistent with Osterman and Kottkamp (1993) who define reflective practice as a means by which educators can develop a deeper level of self-awareness about the nature and impact of their performance, an awareness that creates opportunities for professional growth and development.

This definition of reflection above is consistent with Schon's (1983) definition of *reflection-in-action*. This type of reflection affords the practitioner the opportunity to re-design the task at hand whilst doing it. In addition, van Manen (1991) defines reflection-in-action, as the interactive reflection, that affords the practitioners an opportunity to respond immediately to problems or situations with which they are confronted. He views it as a *stop-and-think* process that allows practitioners to make decisions on their feet. This, according to Beck and Kosnik (2001), means forgetting what happened during the lesson is averted and an immediate remedy is provided as opposed to waiting for future remediation.

Furthermore, Larrivee (2008) and Korthagen (2004) have placed emphasis on the role reflection can play in improving the professional development of teachers. In Physical Sciences teaching, a need arises to ensure that reflection on teaching activity is not merely lip service, but rather teachers are actively evaluating their own teaching practice. Teachers need to reflect on the time they have spent on the activity and how this has affected their intended outcomes, what Schon (1983) refers to as reflection-on-action. He defines reflection-on-action as a process whereby the practitioner intentionally recalls a specific event/action after it has occurred. Moreover, Day (1999a) contends that reflection-on-action is a systematic process that knowingly allows for analysis, reconstruction and re-framing of past actions/events to plan for future events. He goes further to suggest that reflection-on-action may lead to productive collaborations, with regard to planning for the future, as it allows for interaction with other practitioners. These views are also in agreement, with Butler, (1996); Pinsky, Monson & Irby, (1998), who also contend that reflection-on-action is a process where teachers look back on past events, analyse their strengths and weaknesses, interrogate their teaching techniques and place challenges where found, and, in addition, suggest solutions and future directions that their teaching might follow.

Patil (2013) provides that, within the educational context, reflection refers to the process in which the teacher studies his own teaching methods, and identifies the best practices. This is based on his claim that includes the considering of the ethical consequences of the classroom procedure on learners. Within the context of this study, this view has implications, as time allocation and the failure to cover the syllabus have ethical implications on the side of the teacher.

Boud, et al. (1985) states that reflection is an important people endeavour, in which individuals relive their personal experience, rethink about it, consider it over and evaluate it. They view experience as crucial to learning and teaching. On the other hand, Dewey (1933) provides three qualities of reflective people, namely that they are open-minded, they exercise restraint, and they show devotion. Dewey (1933) explains that open-mindedness is the ability to listen to both sides of the issue, paying more attention to alternatives and acknowledging that traditional belief are also subject to scrutiny. He also views responsibility as one's aspirations to probe for truth and the application of the information gathered to solve problems. He further argues that wholeheartedness refers to the individuals' ability to deal with fears and uncertainty to

effect change and evaluate the effect of one's practices on children, school and society (*ibid*).

On the other hand, Larrivee (2008) considers four (4) levels of teacher reflection, firstly *pre-service level*; which he argues to be the level where the teachers only consider the classroom situation, and ignore all other factors that can have an effect on learning. Secondly, he identifies *surface reflection level*; which he describes as the stage where the teacher is preoccupied with tactical issues necessary to achieve the predetermined outcomes and standards. He terms his third level, *pedagogical reflection level*, which he argues to be a level where the teacher takes into consideration how his classroom practices are affecting learners or learning and how to improve such practices. Lastly, he identifies the level he terms the *critical reflection level*. He describes critical reflection as on-going and critical inquiry of one's teaching, considering the philosophy and ideologies that inform practice. In this study the third and fourth levels of Larrivee are more relevant, as the teacher's approach to teaching and the philosophy and ideology to which CAPS is based can have implications for learners and/or learning in general. According to Day (2001), reflection involves the practitioners' critique of his practice, in accordance to the values espoused in his practice, regardless of whether they are implicit, personal, social, and institutional; and the policy context to which practice occurs, as these have implications for the improvement of ones' practice.

Ferraro (2000) further argues that, by acquiring a better understanding of the own practices through reflection, teachers can be more effective in their teaching. Harris (1998) goes on to argue that for teaching to be effective it needs teachers to be continuously engaged in reflective practice. Similarly, Leachy and Corcoran (1996) view effective teachers as those teachers who are reflective of their practices, beliefs, values and are able to identify options availed to them, and take into cognisance their professional values. In addition, they view effective teachers as those who make conscious choices that improve the quality of their work and ensure that such choices maintain their effectiveness.

However, reflective practice is not without its challenges, as Osterman and Kottkamp (1993) argue that emotions of practitioners have a significant effect on reflection due to the fact that they cloud our understanding and decision making capabilities. This point is also argued by Hargreaves (1998) as he views teaching as an emotional

endeavour. Contrary to the views expressed above, Day (1999a) contends that, to disregard emotions in reflection on, in or about teaching and learning, leads to a failure to understand or appreciate the impact on the quality of classroom experience for both teachers and learners. Zembylas (2007) argues that utilizing pedagogical knowledge depends on practitioners' emotions and experiences, and attitudes are as a direct consequence of these emotions, which influence the classrooms' emotional environment. Zembylas' argument indicates the important role an educator, as the practitioner, plays within a school environment. A review of the evidence suggests that the successful reflective practitioner, as the leader, must be able to create a changing environment due to the needs and demands of the class. It is because of those arguments that one needs a constant introspection and reflection by teachers within their own space.

Zembylas (2007) concurs to the claims made by Leithwood et al. (2006) that document school leadership as having, second to classroom teaching, a greater influence on pupil learning. This contention may be considered to be controversial by some. However, Leithwood et al. (2006) chose words that capture the comparative amount of influence exercised by successful school leaders; these authors contend that successful leaders act as catalyst, without which other good things are quite unlikely to happen. These practices can be thought of as the "basics" of successful leadership. Rarely are such practices sufficient for leaders aiming to significantly improve teaching and learning of Physical Sciences in their schools but, without them, not much would happen. Low quality achievement of results in the Eastern Cape seemingly point to the lack of successful leadership and innovational strategies that can provide a decent solution to the crisis.

Glatter, Preedy, Riches and Masterton (1998) explain school culture as the ethos that is believed in and expected by the members of the community, based on their attitudes and behaviours. He goes on to say that each school must provide its unique learning or teaching atmosphere that fits its own situation. He added that replicating and imitating what others are doing in their different teaching or learning practices would be boring and easy. Furthermore, as practitioners, we need to look back and forward in our teachings of our lessons to avoid boredom. We should always be creating new ways that would encourage learners to work towards achieving quality results.

2.4 UNDER-ACHIEVEMENT IN RURAL SCHOOLS

A study conducted by Dhurumraj T (2013) identified the causes of learner poor performance in physical sciences in grade 12 in Further Education and Training (FET) phase in the Pinetown district, Kwazulu-Natal. Upon analysis of the results, several contributory factors for poor performance were identified in Physical Sciences. Among the recommendations he made was a need for improvement in the area identified and topics for future research on curricula of grade 8 and 9 natural sciences were suggested

He claims that it was evident that lack of resources, language and teaching (LoLT), learners doing Mathematical literacy instead of Mathematics, the socio-economic status of learners, parental-involvement, large scale classes, the developmental level of learners and curriculum are all factors which play their part in the poor quality of Physical Sciences results.

The findings made by Kelly (2017) were that assessment models were also perceived to improve knowledge and understanding, develop useful skills and increase awareness of real world occurrences and practices. These models also develop students' eagerness to be more observant in their surroundings.

Another study conducted by Joorster in 2010 focused on the implementation of learning support strategies by intermediate phase teachers. The study determined the factors that impact upon successful implementation of learning support strategies, specifically in the rural area school. This study has encouraged the researcher to examine the teaching strategies that lead to better learner achievement.

The main finding of the study was the huge gap that exists between inclusive education policy expectations and the actual manifestation of teachers' support to learners with learning difficulties. The findings of this study reveal a combination of external as well as internal and systematic factors working in conjunction and culminating in the lack of capacity amongst teachers.

A study concerning the factors that contribute to poor performance in Mathematics and Physical Sciences was carried out by Moses, Kakgato and Mji (2006). The results indicated that two factors were identifiable. The first identified to have a direct influence

related to teaching strategies, content knowledge, motivation, laboratory use, and non-completion of the syllabus in a year. The second factor, associated with indirect influences, was attributed to the role played by parents in their children's education, and general language usage together with its understanding in these two subjects.

The main aim of the study conducted by Magadla (2010) was to establish the possible causes of poor Grade 12 results in Physical Sciences in South Africa and to apply a total quality management (TQM) approach to suggest a solution.

He concluded from the analysis of the results that limited support to teachers and support to learners are important factors contributing to a poor grade 12 pass rate. It was also evident that the experience level of teachers plays an important role. He argued that no correlation could be found between pass rate and level of qualification.

Fonseca and Conboy (2006) looked at the student perceptions of factors affecting failure in Physical Sciences in Portugal. They feel that the causes of failure have to do with teaching and management of the schools. The findings of the study of 10th grade sciences course, according to the students, indicated that quality of teaching and previous student preparation were important factors in determining quality results.

2.5 CONCLUSION

This chapter provides the reader with the literature overview that establishes the theoretical backgrounds for the study. I have discussed several factors that contribute to quality achievement at Grade 12 Physical Sciences. In the following chapter, the research design, the data collection methods and procedures, population sampling techniques, location and demographics are described. Also included are the issues around ethical considerations and informed consent.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter describes the research design, methods and sampling used to collect the data. It provides the data collection process from responses to the research questions as well as the instruments used to collect the data. Issues of validity and reliability are addressed, along with issues around ethics in educational research. Research methodology refers to a process whereby the researcher collects and analyses data. Procedures are not haphazard activities. They are systematic and purposeful and planned to yield data on a particular research problem. This chapter gives a clear elucidation of the methodologies followed to address the following research question and sub-questions:

What were the teaching strategies employed by schools to improve the quality of passes in physical sciences?

- What were the strategies employed by the physical sciences teachers in the three schools sampled from the education district?
- What were the teachers' perceptions of the strategies used in their physical science lessons?

3.2 RESEARCH DESIGN

According to Bless and Higson-Smith (1995:), research design is “a programme that guides a researcher in collecting, analysing and interpreting observed facts”. It is a detailed plan that indicates all the steps in how the scientific inquiry into the research problem will be conducted. The kind of design used for this research study is mixed method, which includes both qualitative and quantitative approaches.

Few schools achieve quality matric results in the rural setting; therefore, it was important for the researcher to use both qualitative and quantitative research design in the study to capture important information. According to Thomas (2003), most authors today see qualitative and quantitative approaches as complementary rather than

antagonistic. He further points out that quantitative methods are, in general, supported by the positivist or scientific paradigm, which leads us to regard the world as made up of observable, measurable facts. In contrast, qualitative methods are generally supported by the interpretive paradigm, which portrays a world in which reality is socially constructed, complex and ever-changing. The researcher used qualitative methods to study the event and issues to its capacity. Moreover, it is used in an attempt to understand the situations in their uniqueness as part of a particular context and interactions. (Patton,1985:17).

According to Babbie et al. (2015), qualitative research paradigm looks at three meta-theories, namely phenomenology, symbolic interactionism and existentialism. They reason that these meta-theories sought to entrench and provide credence to the existence of a qualitative research paradigm. They contended that an important question was asked as to whether quantitative and qualitative research paradigm are mutual exclusive, complimentary or compatible. It is with an opinion that the two research paradigms when used together in a study would give a complimentary and compatible research design that will enhance the study.

3.4 QUALITATIVE AND QUANTITATIVE RESEARCH APPROACH

i) Quantitative Research Approach

Quantitative research describes current conditions, investigates relationships and studies cause-effect phenomena. Schumacher and MacMillan (1993:14) state that quantitative research presents statistical results with numbers. The research involves choosing subjects, data collection techniques, particularly questionnaires and procedures for analysing data. Quantitative researchers attempt to keep the researcher from influencing the collection of data. It was important for the researcher to maintain positive interpersonal relations with the participants involved in the study and strive to be personally detached so that their observations are as objective as possible (Borg and Gall 1989:23). Since the study is on reflection, the researcher allowed the participants to present their honest opinions about the strategies they administer in their classrooms.

ii) **Qualitative research approach**

The researcher used both qualitative and quantitative methods in order to obtain valid and reliable results. Much has been done with regard to examining teaching strategies to improve Grade 12 results in other subjects with the qualitative approach. This study is looking at finding teaching strategies used by other teachers that produce better results

Thomas (2003) advocates that not all research approaches can best give answers to the research questions. Furthermore, the best answer frequently results from using a combination of qualitative and quantitative methods. The researcher's personal experiences and insights are an important part of the inquiry and critical to understanding the phenomenon.

3.4 SAMPLE

Johnson and Christensen (2010:216) see sampling as the process of drawing a sample from the population. When we sample, we study the characteristics of a subset (called the sample) selected from larger group (called population) to understand the characteristics of the larger group; after determining the characteristics of the sample, the researcher was able to make statements based on the sample data. According to Tuckman (1994:309), respondents indicate the number who participated in the study, how they were selected and their characteristics. If another researcher chooses to replicate the study, this provides the kind of information that makes it possible for another researcher to select the identical sample.

Fourteen schools in the district offered physical sciences. The researcher purposively selected three schools that have consistently produced good results in the subject, situated in a rural or semi-rural setting. Good results meant schools that produced many level 6 to 7 results in physical sciences compared with lower levels. The criteria to choose these schools were based on the results analysis provided by the district. Three Grade 12 teachers were selected as part of the study. All three schools were from a rural setting, the same as the researcher's school. According to Gay and Airasian (2003), during purposive sampling, the researcher selects a sample based on his experience and knowledge of the group to be sampled. Table 4 below provided the

results and the indications how purposively the school were selected. The selection was based on the quality of results the schools produced in the previous years.

Table 4: Result of sampled schools for three consecutive years

Physical sciences results	2013	2014	2015
School A	92.59	90.1	92
School B	76.5	62.5	75
School C	100	94.7	94.28

3.5 DATA COLLECTION PLAN

A simple data collection plan is a process to ensure that the data you collect for performance improvement are useful and reliable. Copper and Schinder (2005) proposed that the researcher has to identify the type and nature of the required data and then select those collection methods which are best suited to the collection of the identified data types. This is reaffirmed by Axinn and Pearce (2006) who maintain that the researcher has to adopt various data collection methods to collect the more relevant and authentic data.

3.5.1 Pilot study

The researcher piloted the instruments before he carried on with the study. In social sciences research, the word pilot study is defined into two different ways. Namely refer to so-called feasibility studies which are “small scale version or trial run or done in preparation for the major study”. Or “a pre-testing and trying-out a particular research instrument (Baker (1994). The importance of piloting a study is to identify unclear or ambiguous in an instrument. Piloting also revealed the appropriateness and complications of the instruments. It offers an opportunity for the researcher to be sure of the content when conducting a study. Firstly, the researcher piloted the questionnaires. This was followed by the observation and interviews schedules.

3.5.2 Collection of research data

The research data collection process is summarized in Table 5 below. The collection steps responded to the main research question and the sub-questions.

What were the teaching strategies employed by schools to improve the quality of passes in Physical Sciences?

- What were the strategies employed by the Physical Sciences teachers in the three schools sampled from the education district?
- What were the teachers' perceptions of the strategies used in their Physical Science lessons?

Table 5: Outlined plan to carry out the study

Research question				
What were the teaching strategies employed by schools to improve the quality of passes in Physical Sciences?				
Steps	Methods	Instruments	Sampling	Data analysis
Step 1 What were the strategies employed by the physical sciences teachers in the three schools sampled from the education district?	Observation	Observation schedule	3 Physical science teachers	Thematic analysis
Step 2 What were the teachers' perceptions of the strategies used in their physical science lessons?	Questionnaire Survey Interview	Questionnaires Interview schedule	One physical science teacher at each of the 3 sample schools ie 3 teachers in total	Use of Excel to analyse the data Thematic analysis

Table 5 provides the steps to be followed in order to keep within the time allocated and be consistent in collecting the data.

Step 1: questionnaires were sent out to 4 non-participating respondents for piloting the understanding and rectification of the items if there was any ambiguity. The 4 non-respondents are teachers who teach Physical sciences in different schools. A letter of request was sent, asking to be allowed to observe them in the classroom teaching lessons. This exercise was done twice to check for reliability and to validate the instruments.

In step 2 the questionnaires were issued to active respondents by hand. The participating respondents were given two weeks to complete the questionnaires, and then were to be collected from them. Certain trends were noted from the questionnaires in order to give an indication of what is to be observed in their teaching strategies.

In step 3, the active respondents were observed by the researcher in their classroom, using the observation schedule. I took notes and gathered information that indicated how the teachers vary with their teaching strategies. During observation, an audio recorder or videotape was used to enable the researcher to transcribe and have a clear indication of analysing the data. The focus of the observation was to register new teaching strategies, since the study is reflecting on teaching strategies through comparison.

3.6 RESEARCH INSTRUMENTS (see Appendices A, B, C)

The following research instruments were used to collect the data. To gain optimal information from participants, instruments were used in the form of questionnaire, observation schedule and interview schedule. These instruments were downloaded from the internet. They were redesigned so that the content covered was relevant and adequate

3.6.1 Questionnaires

The questionnaire is a data-gathering instrument through which respondents answer questions or respond to statements in writing. Questions were administered to the teachers personally by the researcher. The researcher had the opportunity to establish

understanding, explain the purpose of the study and the meaning of the items that may not be clear (Best and Kahn 1993:230-231). Therefore, it was important for the researcher to explain and create understanding of the instrument, for a smooth collection of data.

Questionnaires were used to gather information about participants' opinions by asking respondents to indicate how they agree or disagree with a statements given, and giving respondents space in which to formulate their responses [http://www.edu.plymouth.ac.uk/resined/QUEST/index.htm_accessed 22 September 201]. The decision to use questionnaires was to get an overview of teaching strategies used by participants in their lesson. Moreover, the researcher used questionnaires to analyse more scientifically and objectively. Anderson (1998) maintains that to develop valid questionnaires, the researcher must clearly identify his/her general information needs; what data he/she is required for the respondents. To be specific about what you need is critical and will enable the researcher to write questions that would answer the research question and achieve the outcomes of the research.

In constructing a questionnaire, special attention was placed on the type of response expected from the respondents. The wording of individual items is a critical aspect of a questionnaire's validity and reliability. Researchers should aim for the simplest wording possible while still conveying the intended meaning. Designing a suitable questionnaire therefore entails more than well-defined concepts and distinct phrases. The goals of a questionnaire should be clarity, simplicity and intelligibility (Takona 2002:111). The researcher wanted simple but straight- to- the- point responses for clear and simple analysis of the data. Kelly (2003) concurs with Tokana that questionnaires used in study research should be clear and well presented. The use of the questionnaire was mainly to assess how many strategies are used in different classes. The researcher used this instrument to help in the reflection of his teaching strategies.

Questionnaires have both advantages and disadvantages. The use of questionnaires is more advantageous in such a way that the results are easily quantified through computer software packages or by the researcher manually. The analyses of questionnaires can be more scientifically and objectively compared to other forms of research. Therefore, it was important for the researcher to use easy ways to capture

the intended information. The disadvantages are that the researcher is only asking a limited amount of information without explanation. There is no way to tell how truthful a respondent is.

3.6.2 Observations

Neville, Willis and Edwards (1994:81) explain, “what is observed is the researcher’s version of what is there”. While gathering data through observations, hesitation in answering, and facial expressions reflecting various unspoken emotions, fears, aspirations and hopes were noted. Questionnaires sometimes cannot give the true reflection of what participants do in their classroom. Therefore, it was important for the researcher to observe so as to capture direct participations and interaction. This will be very beneficial to the researcher to note the dynamics of the classroom. The researcher will be observing everything that might be adding value or contributing to the production of quality of education.

Multiple but different settings of observation have been done to observe the everyday actions and reactions of the participants in their learning environment. Observation allows for the natural behaviour of subjects in the study and is relatively unobtrusive (McMillan and Schumacher 2006). The researcher also took time to observe learners’ behaviors during the teaching time; the focus was placed on the extent of their attention during the lesson. With this in mind, observation was conducted in the lessons taught by the three teachers in the three different schools. The focus was placed on how Physical Sciences was taught at each of the schools.

The usage and availability of resources were also taken note of during observation of the three schools. Permission was required from both the Department of Education and the principals to do those observations. During the observation, the researcher had to consciously remain aware of my own biases and preconceptions, and how they impact on what I was trying to observe and understand (Maykut & Morehouse 1994:18)

As part of research, observation can be used for a variety of purposes. In this study, observation was used by the researcher to capture or assess the different teaching strategies of participants. Hatch (2002:72) considers observation to be a specific data collection strategy that can be applied across many kinds of qualitative studies. The

kind of observation used in most qualitative work is usually called “participants’ observation” because the researcher acts as participants at some level in the settings he or she is studying. The goal of observation was to understand the culture, setting or social phenomenon being studied from the participants’ point of view.

The researcher used an observation schedule to be able to “see” what participants view as not being important. Many important features of the environment and of behaviour are taken for granted by participants and may therefore be difficult for them to describe. Moreover, important patterns and regularities in the environment may only be revealed by careful, planned observation by a researcher over a period of time. However, the major disadvantage of observation is that it is prone to perpetual errors as the researcher’s opinion is used in making conclusions (Waltz, Strickland & Lenz, 2010, P. 279). Therefore, the researcher needs to be honest as possible not to manipulate the results.

3.6.3 Interviews

To allow for contextualization and elaboration of the meaning of data, data collection techniques should be administered. According to Tuckman (1972), interviews can allow us to know what is inside a person’s head; it makes it possible to measure what a person knows (knowledge or information), what a person likes or dislikes (values or preferences), and what a person thinks (attitudes and beliefs). Interviews may also be to test theories or deliver new ideas (Cohen, Manion & Morrison, 2007). Seidman (1991) believes that interviewing is one of the best instruments for qualitative data generation.

The researcher initially intended not to have interviews as part of the collection plan due to the limitation of thoughts and ideas provided by the instruments used. The researcher decided to interview the respondents to allow them the time and opportunity to talk about their opinions on a particular response given. Interview questions were developed based on what was observed during the observation lessons.

3.7 DATA ANALYSIS

Gardner (2009: 260) explains that data analysis refers to the process of inspecting, cleaning, transforming, and modelling data with the goal of discussing useful information, suggesting conclusions and supporting decision-making. In the previous chapter, the research methods and procedures of collecting data were stated and described. The main objective of this chapter is to discuss data processing and analysis for the purpose of testing responses.

The data were analysed using both qualitative and quantitative approaches. An audio recorder was used during the observation period to capture the interaction of the teacher and learners in the classroom engagements. The data was captured through audio or videotape to be transcribed in writing and translated into English if another language is used.

The researcher triangulated the response from questionnaires with observation in transcribing, dividing the information into smaller and more meaningful sections. After the transcription and translation, the data was cleaned. The data were read many times to find common themes that would emerge and be coded, categorized and refined. In this research, trends and links were highlighted and considered when analysing the data. Some themes were analysed on Excel as graphs to interpret the information. Those graphs helped the researcher to analyse data quantitatively using percentages. The questionnaire items formed the basis of discussion for the results of the study. The questionnaires were used to describe values derived from questions on the questionnaire. Those values were expressed in the form of percentages for comparison purposes.

Triangulation is the process of using multiple data-collection methods and sources to check the validity of the study findings. The key to triangulation is to vary in some way the approach used to generate the findings that the researcher is seeking to corroborate.

3.8 VALIDITY AND RELIABILITY

3.8.1 Reliability

Reliability is the degree to which an instrument produces stable and consistent results (Cozby 2001). I piloted the instrument with respondents who were not part of the sample to check for language and, to ensure that there is no bias, they were requested to complete the questionnaire. I then detected that the language was clear, the items were clearly understood and unambiguous. If necessary, I had to re-word the items. I administered the same questionnaire twice to ensure reliability. The scores from the two tests were correlated to evaluate the test for stability.

3.8.2 Validity

Fraenkel and Wallen (2000) assert that validity refers to the appropriateness, meaningfulness of the specific inferences researchers made based on the data collected using an instrument. These instruments, before being issued to respondents, were given to colleagues to proof read them to ensure that they were valid. The aim and the research questions were clearly structured to focus and link them well with the instrument. Observation and questionnaires were chosen in this study to collect data to be able triangulate the results.

Holton and Burnett (1997) claim that reliability and validity used can be valid if they measure what they are supposed to. In this study, the questionnaire and observation schedule were regarded as valid and elicited accurate information. They provided a real reflection of challenges facing grade 12 physical sciences teachers and learners and the reasons why learners do not obtain physical sciences results of quality.

3.9 ETHICS

In any research it is important to undertake ethical and legal practices. It is important to adhere to universal ethics such as honesty and maintaining respect for the rights of individuals (Welman, Kruger and Mitchell 2010:181). Before engaging in the study, a letter of request was sent to the Department of Education Eastern Cape to allow the

researcher to continue with the study. Informed consent is achieved by providing subjects with an explanation of the research (MacMillan & Schumacher 2006:143).

Letters of permission were sent to the principals of the school, the school governing body, and participants for their consent (Appendix 3). They were clearly told of the respect of confidentiality, identity and professionalism. Participants were made aware of freedom to withdraw from the study. Their identities were kept private. For ethical reasons, the name of the schools and teachers were given pseudonyms.

According to Leedy (1997:116), a 'Resume' of the code of ethics of the American Sociology Association (ASA, 1982) may be sufficient to indicate the ethical consideration that should govern activity associated with any research project:

- Researchers must maintain scientific objectivity.
- Every person is entitled to the right of privacy and dignity of treatment.
- Confidential information provided by research subject must be held in strict confidentiality by the researcher.
- All research should avoid causing personal harm to subjects used in the research.
- Research findings should be presented honestly without distortion.

3.10 CONCLUSION

This chapter dealt with the methods that were followed and the intentions to conduct the study. The manner in which data were collected, analysed and why these methods were used, have also been outlined in this chapter. Furthermore, the choice of data gathering instruments (questionnaires and observation schedule) and the sample were discussed and a detailed outline of the procedure to be followed has been provided. Strict rules governing aspects of research and ethical concerns were carefully discussed and were observed throughout the whole process of the study. The next chapter presents the results of the research.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 INTRODUCTION.

The previous chapter highlighted the research methodology employed to answer the research question. In this chapter, the results of the data collected are presented in the form of text, tables and graphs. The results are outlined in response to the research questions:

What were the teaching strategies employed by schools to improve the quality of passes in Physical Sciences?

- What were the strategies employed by the Physical Sciences teachers in the three schools sampled from the education district?
- What were the teachers' perceptions of the strategies used in their Physical Science lessons?

The presentation of the results follows a detailed description of the perceptions according to themes and categories generated from teachers' statements to questionnaires, interviews and observation schedule. This chapter is divided into three major sections: Section 1: this section will be examining the quality of learners' achievement of results and the pass percentage these schools obtained over the three-year period. Section 2 details the results obtained from the observation schedule. Section 3 presents the results obtained from the questionnaires and provides the description of informal interviews.

4.2 SECTION 1

4.2.1 Examining learners' achievement

Three Grade 12 Physical Sciences result for schools A, B and C are listed. The data collected outlined the percentages and the levels these schools obtained in Physical Sciences over a three-year period. These results were sourced from the district

education office through consultation with the district officials and the teachers of three sampled schools. Table 6 below tabulates the evidence of these results.

Table 6: Grade 12 physical sciences pass percentages and levels

Name of school	2013							2014							2015						
(A)	92.59%							90.1							92%						
	Levels achieved							Levels achieved							Levels achieved						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
	2	4	2	6	6	5	4	2	3	4	3	7	5	4	3	3	3	8	3	2	3
Physical sciences																					
(B)	76.5							62.5							75.0						
	Levels achieved							Levels achieved							Levels achieved						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
	4	2	2	3	2	2	1	2	1	1	3	4	1	0	2	0	2	5	4	1	0
Physical sciences																					
(C)	100%							94.7%							94.28%						
	Levels achieved							Levels achieved							Levels achieved						
	1	2	3	3	4	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
	0	2	2	3	2	2	1	1	3	2	3	4	2	4	2	8	4	5	4	7	5

According to Table 6, the overall results for Physical Sciences in School A indicate consistency over the three year-period. The results remain at least over 90 percent over this period. The quality of results at this school also improved each year from the previous year. Data from Table 6 show that learners in school A obtained two level 1, four level 2 and 2 level 3 in 2013. There were two level 1, three level 2 and four level 3 in 2014. In 2015 the table indicates three level 1, level 2 and level 3. There were also four level 4 in 2013, four level 4 in 2014 and three level 3 in 2015 respectively. The quality of level 5 to level 7 learners achieved over the period is improving if we count the levels obtained above level 3 for the past three years. Table 5 also reveals that many learners in school A were able to obtain levels that would allow them to enrol in Science related courses at universities.

Results for school B in Table 6 above, show an increase in pass percentages over the period of three years. The results increased from 75% in 2013 to 83.8% to 87.5% in 2015. The levels for school B for the three consecutive years are: in 2013 there were four level 4, two level 2 and 2 level 3. In 2014 there are 2 level 1, one level 2 and one level 3. In 2015 there are two level 1, zero level 2 and two level 3. Moreover, many more learners achieved levels between four to seven than those who achieved below level 3. The percentage achieved in 2015 was 75 percent in Physical Sciences for 14 fourteen learners enrolled.

Table 6 summarised how school C has been performing in Physical Sciences from 2013 to 2015. The results in 2013 indicate that school C obtained two level 1, four level 2 and two level 3. In 2014 they obtained one level 1, three level 2 and two level three. In 2015 they managed 2 level 1, 8 level 2 and four level 3 respectively. School C enrolled different numbers of learners each year therefore the comparison is based on the number of learners enrolled and a how many levels achieved. Levels are classified as a bench mark that enable learners to be admitted at university. Table 5 above also shows the number of level 7 in 2013. 2014 and 2015 were 1, 4 and 5 respectively. Thus, the quality of the results obtained indicate improvement over the three years.

4.3 SECTION 2

4.3.1 Questionnaire (see appendix C)

4.3.1.1 Perceptions, opinions and views to be assessed

The table below highlights the perceptions, opinions and views the respondents have on certain aspects of teaching strategies and achievement of quality results. These questions form the basic question that informed the researcher about the areas on which to focus during observation and interviewing the respondents.

Table 7: Data from the respondents

School	In-service training	Improvement strategies implementation	Strictly follow work schedule	Success of teaching strategies used
A	4 strongly disagree	3. agree	3 disagree	3. disagree
B	1 strongly agree	2 agree	4 strongly agree	2 agree
C	1 strongly agree	3 strongly agree	4 strongly agree	3 agree

Table 7 above provides information of the respondents from the questionnaires. The table set out a ranging scale from agree, strongly to strongly disagree with the implementation of items. These items probe whether the respondents, believed (1) teachers should go for in-service training when teaching Physical Sciences. (2) Teachers are keen to use different strategies to improve learner quality results. (3) There should be a strict measurement to follow the work-schedule provided by the district office. (4) how much confidence they have in the success of teaching strategies employed to improve and achieve quality of results in their schools.

Responses to questions

Question 1: ***Should teachers be provided with in-service training in how to manage their classrooms?***

Grounded on the responses provided from teachers' questionnaires, question 1 (annexure C). Teacher #1 in school A selected strongly disagreed. He had indicated that teachers need no in-service training according to the choice provided. On the contrary, teacher #2 in school B and teacher #3 in school C had selected strongly agree. These teachers believe that teachers should constantly equip themselves with knowledge and skills. The researcher had a chance to discuss the choice of answer with the respondents. It was evident that teacher #1 did not read the question properly

and did not pay attention to the choice made. When asked, he mentioned that he meant to choose strongly agree instead of strongly disagree. He further elaborated that there is need for teachers to be equipped with necessary skills to manage and conduct classrooms effectively.

Respondents had strong sentiments and made it clear that teachers should have good content knowledge when teaching Physical Sciences. They all believe that in-service training should continue to equip teachers for the benefit of the learners and the society.

Should teachers strictly follow a work schedule?

Teacher #1 and teacher # 2 chose a scale of 4 which strongly disagree. Teacher #1 and #2 have confidence that work schedules should not be followed strictly but as a guide and time frame to finish the syllabus. They also claim that it is important for teachers to have the work schedule and creates a clear picture when to complete the syllabus and be able to improvise for the benefit of the learners. Teacher #1 had the idea that a work-schedule is just a guide to convey what topics should be covered, and one can develop his or her work schedule that will suit his or her classroom. Teacher #3 strongly agreed that a work schedule should followed strictly. He claims that a work schedule has been designed to assist teachers to cover certain topics at the specified time frames.

Can different improvement teaching strategies be implemented successfully?

On the successful implementation of teaching strategies, teacher #1 chose disagree fully. Teacher #2 selected a scale rating agree and teacher #3 selected strongly agree. Based on the implementation of the improvement strategies to achieve quality results in physical sciences, respondents had agreed respectively accept Teacher #1 on the item. It was evident that they try to implement more strategies to achieve quality of results in their respective lessons' scale rating: agree was chosen by teacher #2 whilst teacher #3 chose strongly agree from their respective schools. They all had different views about many different teaching strategies being implemented successfully.

Do you implement teaching strategies that enhance your competence as teacher?

Teacher #1 disagree strongly that many strategies have enhanced the competence as the teacher. However, teacher #2 and #3 agree that teaching strategies they implement enhance their competences.

4.3.1.2 Ratings relating to learners in the lessons and classroom

Four ratings of the core areas of learners in the lesson and classroom were rated based on the scale that ranged from 1 to 10, rating number 1 as poor and 10 being excellent. Respondents rated their learners on the four aspects of classroom and lesson disciplines.

- Learners’ aspect on rating involves commitment by learners in the studies.
- Learners are able to speak freely in the classroom.
- The discipline learners show during lessons or in their classroom.
- Whether the School Management Team (SMT) provides material support to learners and teacher.

The table below reveals respondents’ information.

Table 8: Provision of rating scale information

Rate the following statement on scale 1 to 10. Where 1 is poor and 10 excellent											
		1	2	3	4	5	6	7	8	9	10
2.1	Learner commitment			T#1				T#2	T#3		
2.2	Speak freely in class						T#2 T#3				T#1
2.3	Discipline in class								T#2 T#1	T#3	
2.4	Support by SMT	T#1							T#2		T#3

Teacher #1

The choice of scale in the table above indicates that Teacher #1 in school A chose a scale rating of 3 on learners' commitment. The rating "On learners being able to speak freely in class", T#1 chose 10 as excellent. The aspect of discipline in class or lesson in school A was found to be rated 8. Lastly, the aspect of support provided by management was scaled as poor (1).

Teacher #2

The aspect of learners' commitment, T#2 rated learners a scale of 7 on the effort made put in the lesson. Speaking freely in class was scaled 6 and further rated 7 the issue of discipline. T#2 felt that the support by management team played a big role within Physical Sciences was rated 7.

Teacher #3

According to Table 7 above T#3 on learners' commitment chose a scale of 3, which is closer to poor. A scale of 6 was chosen on the aspect of learners being able to speak freely in the classroom lessons. On the issue of discipline, T#3 believes that learners are more disciplined by the scale of 8. The support their school management team provides in school is rated 10 for excellent. The figure A below provided an overview on how respondents rated learners on the Questionnaires

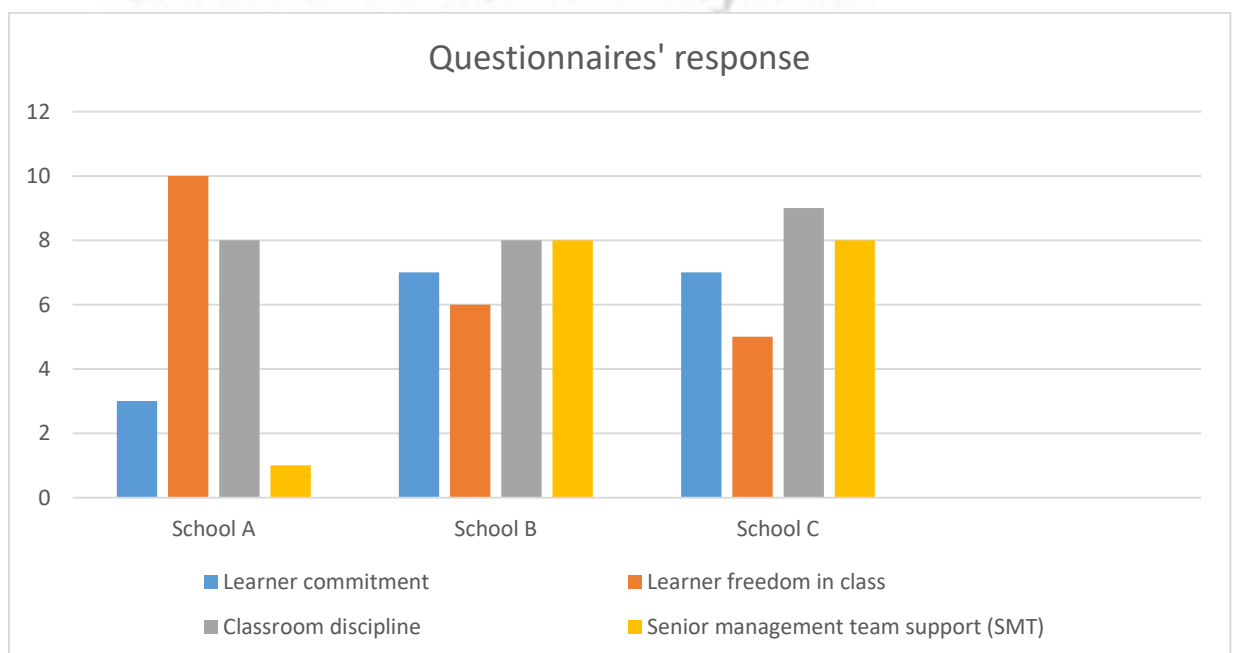


Figure A: Respondents' responses from Questionnaires

Figure A above presented perceptions of teachers about learners' commitment, discipline in class, freedom to participate and SMT input in the achievement of results in Physical Sciences. According to the results obtained from the questionnaires school A claimed that Physical Sciences learners do not show commitment in the lesson, whereas teacher #2 and teacher #3 indicated that at least more than 60% learners in their class do show commitment.

Figure A also points out that at least more than 50% of learners in the classroom are given freedom. Teacher #1 indicated that learners in the classroom participate freely up to 8 compared to 10. Teacher #2 rated learner freedom at 6, whereas teacher #3 indicated learners' freedom at 5 out of 10. This study indicated that learners are given freedom and are free to partake in class discussions.

Figure A illustrates that teacher #1 does not have issues of discipline in the classroom; she indicated that learners in her class have discipline and a scale of 8 out 10 was chosen. Teacher #2 rated her learners to a scale of 8 out 10. This indicates that more than 80% of learners in her class have discipline. Teacher #3 indicated that 9 out 10 have discipline. Teacher #1 valued SMT support to a scale of 1, teacher #2 scored SMT support to a scale of?

Extra lessons offered by the teachers

The following question was posed to Grade 12 teachers of Physical Sciences: What extra sessions do your Grade 12 learners receive in your school? Based on assessment question 3 of the questionnaires (appendix C), the respondents' response on extra-class and learning session for grade 12 are presented in Table 9 below.

Table 9: extra class lesson offered in school

	School A	School B	School C
Morning session before school		x	x
Afternoon after school		x	x
Saturday classes			x
During June/July holidays	x	x	x
I only teach during normal hours	x		

Morning session before school

The table above shows that teacher #1 in school A did not offer morning session for learners although teacher #2 in school B did offer morning sessions to enhance his teaching and to cover his syllabus. The table above also indicates that teacher #3 offered morning sessions for him to cover the syllabus and for revision.

Afternoon sessions after school offered

According to the selection made by teacher #1, afternoon sessions are not considered as part of their teaching of the syllabus. Schools B and C teachers did offer afternoon sessions for learners to improve and assist learners to achieve better results in Physical Sciences.

Saturday sessions offered

Based on the responses to the teacher questionnaire, question 3 (annexure C), Saturday sessions for Physical Sciences are not offered in both schools, A and B. These teachers claim they are too busy to teach on weekends. The table above shows that only school C offered Saturday sessions. The teacher claimed that the syllabus is too long and needed more time for learners who want to excel and improve their quality of symbols at the end of the year.

June/July session offered

According to responses given by three schools about June sessions being offered in the three school indicates that all schools did offer June sessions as extra time for teaching and assisting learners.

Teach only during normal hours

Teacher #1 in school A had stated that teaching must be done in class with no extra-sessions offered, therefore she chose the normal hours of teaching. However, teacher #1 and teacher #2 share the same view that it's impossible for them to complete their syllabus in class to maintain and improve the quality of results in their schools.

Ways to inform assessment in planning for lessons

Based on teacher responses to question 4 (appendix C), which requires them to indicate: what assessment informs them in planning their lessons?

Teacher #1's experience and marking experience of grade12 question-papers in the November examination informs the teacher to prepare the lesson to accommodate the mistakes learners made when writing the final examination. The planning of the lessons in teacher #2 classroom is based on the teaching experiences, curriculum assessment policy statement (Caps) and the examination guidelines provided by the Department. He also underlined the knowledge content, what learners should know, as the foundation to a particular section or topic the practical approach also plays an important role. Teacher #3's lesson planning is informed by work-schedule, curriculum assessment policy statement (Caps) document, examination guidelines and his experience acquired in marking.

What ways can be used by assessment to inform teaching?

Teacher #1 did not answer question 5 of the annexure hence I had to probe why the question was not answered. She told the researcher, "I did not understand the question". When the question was clarified: her response was, "my teaching is informed by a lot of things, example, the knowledge which includes experiences and type of question that are asked and the examination guidelines plays an important role". Teacher #2 wrote that her teaching is informed by a practical approach and demonstrations to clarify the section or topic. Teacher #3 did not write any response to the question. Upon meeting him, he indicated that he did not make any meaning to the question.

4.4.1 Strategies employed to improve learners' results

The observations focused on three aspects of teaching strategies with regard to the research investigation i) learner engagement in the classroom; ii) planning to deliver a specific topic and (iii) learner assessment strategies. The observation schedule encompassed features like activity, learner and educator actions and movement.

4.4.1.1 Observation in school A (Example of one lesson)

I) Learner engagement in school A

Learners walked into Physical Sciences classroom with classwork or homework books. Some learners pulled out their books when reaching the classroom entrance. In addition, all learners showed the proof of work being done and the educator signed

their books. Learners listened attentively and displayed respect while the teacher was busy monitoring the entrance.

The teacher requested learners to write corrections on the chalkboard whilst he was seated watching the process. Learners participated freely as they worked through possible answers. Learners wrestled to write answers of the questions they thought were easy for them but finally they settled. I heard one saying. Learners enjoyed what they were doing and those seated were trying to compare whatever they wrote to what was presented on the chalkboard. They corrected themselves first before the teacher was involved. The presentation of the corrections was written with alternative answers because there were learners who approach the questions differently. Learners would constantly glance at the teacher to get her reaction and comment but nothing came from the teacher.

Teacher #1 began her lesson by outlining the importance of understanding the previous knowledge on forces. She then instructed learners to write up the possible answers as correction to a homework given previously, while moving around checking and signing learners' books. Teacher #1 gave feedback on every question presented; however, before her feedback, she scanned through the answers and asked the rest of the class to comment on answers provided. She then handed out the pamphlets.

Teacher #1 emphasized that the lesson is the continuation from grade 11 and learners' previous year notebooks would be advantageous as the reminder. She highlighted that if they understand forces they will not have any problem with WORK, ENERGY AND POWER topic.

Teacher #1 continued her lesson by saying:

“This lesson will be more like revision; therefore, we need to assist each other going forward. She reiterated, “If you master this section, you will not have any problems with WORK ENERGY AND POWER which is the section most learners find difficult to understand”

She immediately posed one- on- one questions for learners to recall the type of forces they know. Learners were asked to recall question at the beginning of the lesson. The first question teacher #1 asked learners to name the type of forces they know: “Name the type of forces you know”. She randomly selected those who raised their hands.

Teacher #1 picked one of the girls seated in the middle of the central row. The teacher said, “let’s hear what learner #1 is going to say.” She called her name.

Learner #1 in school A stood up and gave her answer: “Types of forces are Force of gravity, Normal force and Frictional force”. She paused thinking and looking up and saying” Pushing force and Pulling force”. After her response she kept quiet, still on her feet looking at the teacher.

The teacher asked her to take a seat. After the response, teacher #3 probed further as to whether those forces were correct or were the only forces learners understand.

Learner #2: “Teacher I think there are forces missing from learner #1”

The teacher’s response was: “do us the honour and name them “

Learner #2’ responded freely with confidence saying: “There is also

*Forces like Friction
..... magnetic force
Electrostatic force
And applied force”.*

The classroom was quiet and learners were busy trying to recall other types of forces they might know. The level of noise was managed at all times with a few comments coming from learners who had answers.

The teacher introduced the concept of work done by asking, “What is work?” She defined work done based on the responses learners gave. Although some responses were wrong, She tried to accommodate learners who struggled with a definition but had an idea of what work is. She then defined work done according to the examination guideline. She wrote on the chalkboard: “Work done is the product of the net force and acceleration in the direction of the force” in words and the mathematical representation”. She emphasized that the net force must be identified

(ii) Lesson-planning to deliver a specific concept in school A

The teacher had his notebook, textbook and photocopied material ready for the class activities. Teacher #1 and his learners appeared to have an understanding that before everyone enters class, they must present their homework as the requirement for admission. If a learner cannot show his or her work, that learner must stay outside and do the work just outside the classroom quietly before being granted permission to enter. Learners were quite excited and enjoying what they were doing. The teacher announced the importance of time and all this took less than ten minutes because the number of learners matched the number of question presented on the board. While learners took the initiative to present their answers the teacher signed their books.

(iii) Learner assessment strategies in school A

At the beginning of the lesson the teacher used oral questioning technique strategies to assess the prior knowledge and ability to recall type of forces understood. Questions were directed at learners and the selection of learners to answer question had no particular order; however, the teacher chose learners with intentions. Towards the end of the lesson a designed worksheet was used as the assessment tool. Learners were given worksheets to identify the type of forces and to define work done according to the forces chosen. At the end of the lesson, learners were given short question papers as classwork. These question papers were developed from November/December final grade 12 examination.

4.4.1.2 Observation in school B (Example of one lesson)

(i) Learner engagement and learner commitment in school B

Teacher #2 in school B began her lesson by instructing learners to recite the terminologies as they are stated in the examination guidelines. Randomly she would pose questions and wait for a response. She waited for learners to raise their hands but chose a learner for an answer by calling the name of the learner. I noticed that not all learners raised their hands and defined the terms correctly; however, if the attempt is made, she then redirected the same question to another learner for response. She took at least 10 minutes with definitions of terminologies.

Learners were kept involved in class as she used the experimental approach to keep learners engaged in the topic presented. Teacher #2 used a quick demonstration to validate the concept of electric circuits (Ohm's Law). Learners watched while the teacher was busy connecting and explaining. Learners were asked questions to test their understanding before she continued. She then divided learners into small groups of four; each group was allowed to interact with the apparatus and encouraged to make its own analysis of the purpose of the demonstration. Worksheets with instructions were given out to learners to guide them and follow the exercise. With guidelines on the worksheet they were given an opportunity to work with apparatus to perform the practical and collect data. Their observations were tabulated and presented by one member of each group. Members of the group were allowed elaborate if there was a need. She then consolidated their responses to one common answer to conclude the experimental demonstration.

Teacher #2 was prompted to administer a variety of strategies to make concepts understood. Phet simulation (Phet is an alternative internet program for demonstrating an experiment) was also used to give a clear understanding of Ohm's Law. Phet was used because there was an argument amongst learners in one of the groups.

Learner #1:

"Ma'am we are not getting the same value for the same experiment".

Teacher #2:

"Yes you will not get the same results because certain conditions are not excluded in the experiment" Practically or experimentally it is difficult to keep the temperature of the connecting wires unchanged".

Teacher #2

"Remember resistance of the circuit depends on the current flow, therefore an increase in current on the wires results to decrease of resistance and more is energy lost in the form of heat. This means that the temperature on the wires increases".

Teacher #2 changed the teaching strategy to Phet simulations:

"I am using this simulation for accurate results and all the conditions are assumed to be excluded in the simulation".

Teacher #2 concluded her lesson by defining Ohm's-Law through linking the changes of different learners' observations during the demonstration. She linked the definition of Ohm's-Law in the textbook with what was observed during the experiment.

(ii) Lesson-planning to deliver a specific concept in school B

Teacher #2 prepared a notebook and a lesson plan template was used to guide the lessons. At first learners were seated facing upfront meaning all attentively facing the teacher during the introduction of the lesson. Learners were re-arranged and seated in groups of two, all facing the front, the teacher's desk or chalkboard. The lesson took place in a laboratory and the apparatus was prepared in advance of the lesson. A Data-projector was also used for demonstration purposes during the Phet simulation. A worksheet was prepared prior to the lesson but kept on top of teachers' desk including assessment questions prepared for the later part of the lesson. The lesson seemed to have followed certain structured time frames or patterns. The period lasted 58 minutes, and included well- planned activities within the given timeframes.

The teacher used the classroom space to attend to each and every learner by making eye contact, asking questions directly and moving closer to a learner. Examples were also given for clarity and assessment purposes. Homework was issued towards the end of the lesson. The classroom was colourful with charts that demonstrate or explain certain concepts of Physical Sciences

(iii) Learner assessment strategies in school B

Teacher #2 began her lesson by assessing learners. The teacher assessed them with regard to the terminologies discussed and the topic they were busy with in that lesson. Every learner in the class was expected to be accurate and there was no room for incorrect and inaccurate definitions of terms. She also explained that they should be able to define concepts as they are expected to do so during the examination.

Furthermore, emphasis on learner engagement was more pronounced, with demonstrations and an experiment used. She gave learners enough scope and reiterated that concepts must be articulated according to what the abstract content requires. Lastly, group discussions and learner engagement were encouraged. The educator would not accept wrong responses, she expected the learners to be very accurate when answering question.

Teaching strategies of content were characterised by learners' participation, explanations, assessment and the use of practical demonstrations or Phet simulations to explain the concepts. I observed that each learner was compelled to explain or comment on concepts that were discussed during the lesson.

4.4.1.3 Observation in school C (Example of one lesson)

(i) Learner engagement in school C

Presentation of the lesson

During the observation in the classroom in school C, it was evident that learners enjoyed the lesson. They participated freely and did not hesitate to ask questions when they wanted more clarity on a particular concept. Teacher #3's lesson was a revision-type of lesson from the June examination. He began his lesson in a lamenting tone, warning learners that they do not care when writing. He specifically pointed to one of the boys:

Teacher#3:

“the way you write is not readable, and it can fail you”

“if I can ask you to read what you have written during examination you cannot read it yourself”.

He begged them to write clearly and neatly. He immediately stated the objectives of the lessons.

The lesson outlined important aspects of the paper written, how learners should respond to questions, and how they actually performed during the examination. The lesson was mainly chalk and talk and there were no specific groups formed or arranged. Learners were seated randomly and there was no ruling on how to seat from the teacher. I guessed the reasons for not grouping was that he had only eight learners in his class. Each learner had his or her own question paper to look at and the answer-sheet to write their answers on, prepared by the teacher. Teacher #1 requested them not to write on the question paper since he intended to use the question paper in the near future.

Learners started answering the multiple choice questions for about 35 minutes, the maximum time allowed, and the teacher had to stop them from writing. He instructed at least three of them to write their answers on the chalkboard. An interesting argument and a huge debate arose because answers presented were different from learner # 1 to learner # 2 in some questions. Teacher #3 provided an opportunity for learners to explain to each other how they managed to get to their answers. The teacher decided to sit beside the chalkboard while watching learners explaining their answers.

Teacher #3 moved around to check whether all learners managed to complete the task. After learner #1 finished writing he gave a chance to learner #2 in school A., while learner #2 was busy writing his solutions on the chalkboard. The class started to make a noise of disagreement and comparison by comparing the solution and the explanation provided. It was also obvious that the majority of learners had difficulties in interpreting some questions in physical sciences paper two. Some learners needed to be given clarity to certain questions.

After the disagreement and debate teacher #3 intervened by giving the correct solution to the question and deep explanation of the concepts.

(ii) Lesson-planning to deliver a specific concept in school C

Teacher # 3 prepared his lesson by organising question papers and answer-sheets for learners. This was done prior to the lesson and learners were asked not write on the question papers. It appeared that learners were made aware of the type of lesson they were going to have. After the comment about how learners should write during examination, the teacher reminded learners about the type of lesson they were going to have.

The planning of the lesson was not presented on the piece of paper. Teacher #3 did not provide a tabulated plan for the lesson when asked. When I asked him, "*Do you have a structured plan for the lesson?*"

Teacher # 3 replied

“This is a revision type of lesson; I did not need to have a structured plan to be written down for this lesson, reason is that I will be using their trial question papers. Learners will answer the questions and we will discuss them together”

Teacher # 3 in school offered no other material besides the question paper and its marking guidelines. Learners had their textbooks to consult when answering questions. The lesson took about an hour and they managed to complete only the multiple choice question. He asked learners to go through the question-paper on their own and promised that they will continue to discuss the rest of the questions the following day.

Although the lesson was not following a structured lesson plan, it was evident that a certain pattern was followed. Learners were given an opportunity to debate and a controlled classroom discussion was encouraged. Peer assistance was also at the forefront of the lesson. I had observed that only two learners were given an opportunity to explain each question beside those who wrote their solution on the chalkboard. Then the teacher gave his final word on a specific question. When learners had questions to probe the educator referred them to the textbook.

(iii) Learner assessment strategies in school C

Teacher # 3's lessons took the assessment form of lesson but learners were given a chance to use their textbooks to find answers. This lesson was more of the reflective lesson; learners had to reflect on the responses they provided during the examination. The teacher read the questions on the question paper and waited for the response. Learners would go through the question individually and discussed them amongst themselves before they called out the answers.

Learners were encouraged to give explanations and justifications on how they managed to get to an answer. Teacher #1 allowed learners to engage in a small debate before he gave out the correct answer and justification. He would give a detailed explanation and also ask learners to refer to the textbook. Learners' misconceptions were rectified immediately. Each learner in the class was motivated and encouraged to make their own analysis and response to question in his or her way and provide justification for the chosen answer.

Most learners kept quiet after they had been chosen to respond. The teacher #3 called by name to a specific learner to answer the question. He then allowed the rest of the class to have their opinion and analysis to the provided solution. Learners became enthusiastic during this time and were free to express their views regarding the explanation and justification provided.

During the assessment teacher #3 was moving between learners assisting those who sought clarity on the questions. This session is not a formal type of assessment but learners were required to use the methods and materials they had to give a correct solution and justification of the answer.

4.5. Interviews

Interviews with the teachers were conducted at an agreed time after the observations during the school day. The interviews were conducted as the Matter Arising from the questionnaires to what was observed in the classroom. The researcher and the interviewees were seated comfortably so that eye contact and other gestures could be noticed, without being interfering. During the interviews, the teachers freely and comfortably answered the questions.

4.5.1 Responses to interviews

4.5.1.1 Teachers' responses to interviews

The first question posed to teachers was about their ability to enforce or encourage learners to do their homework before coming to class.

T#1 said: learners who take their work serious are bound to achieve good results. Therefore, it is my duty as the teacher to maintain discipline and enforce learners to do their homework. Hence the proof of homework was required as the requirement for them to enter classroom.

T#2 said: my learners knows that I do not accept excuses when it comes to submission of homework or anything I had asked them to do. For example, if I asked them to study definition, I expect them to take it serious and do more than I had asked. In the event they do not adhere to that, punishment will be effected. Punishment was not specified.

T#3 pointed out the majority of learners get used to him from grade 10 and understands what is expected from them. He claimed that he does not take any nonsense. Learners must prepare for proper reasoning, otherwise the school management team (SMT) have devised ways to enforce learners by detaining them.

Why extra teaching sessions, when you are not behind with your syllabus or work-schedule?

T#1 said: *Normally I do not do extra lessons to finish syllabus but to cater for learners whom their grades are very low. My extra lessons are targeting learners who gets below 40% pass. My top learners are excused and encouraged to work hard during normal lessons.*

T#2 said it was very difficult for her to finish or complete syllabus during normal class lessons as she had to deal with management issues. She claimed that she used extra lessons for clarity and equipping learners with skills to solve problems; to familiarize learners with exam type of questions as well as creating an opportunity for them to assist themselves.

T#3 said that extra lessons are done as the compulsory measure in his school. Subjects like Physical Sciences, Mathematics and Accounting are given extra lessons and teachers for subject are transported. Therefore, the school made it their responsibility to give learners extra time.

Teachers were challenged with possible teaching strategies used to support learning progress: teacher#1 mentioned strategies varying from rewards to learning support from the SMT. Varying the lessons with different methods of teaching raised learner interest. He stressed that some learners find it more difficult to understand when teachers just write on the board. Having them experiment with apparatus makes them more curious to learn and understand Physical Sciences. Using programs like PHET makes learners visualize what teachers are talking about rather than imagined. Teacher #2 and #3 highlighted that varying teaching strategies arouse learner participation and increase their interest in Physical Sciences. They further argued varying teaching strategies does not only interest learners but caters for all type of learners in terms of understanding. Teacher#2 used an example that using PHET simulations on force helps to demonstrate the principles and learners have an opportunity to experience and access the concepts any time. Teacher#2 mentioned

that she wanted to explore ways making the content more meaningful and interesting to learners.

Another question posed was based on the issue of discipline: referred to strategies for culture of teaching and learning. All three teachers referred to management of the classroom and the school's code of conduct that addressed particular disciplinary issues and procedures in cases of transgressions. The school management team (SMT) do not compromise the issues of discipline. Mostly, a culture of teaching and learning is spear-headed by subject teachers who maintain disciplinary measures within their classroom. Teacher #1 believes that a healthy educational environment goes hand in hand with effective learning and teaching.

Teacher #2 said: *“All learners in the classroom must be put to task and sometimes they know the answer but refused to participate in class”*. Assessment is a priority to all learners in the classroom.

He claimed he was surprised how certain learners became open during discussions. Learner engagement and learner commitment was chosen at the scale of 8 out of 10 by teacher #2 and teacher #3.

4.6 Analysis and discussion of results drawn from questionnaires, observation and interviews in each school

4.6.1 Learner engagement and learner commitment in school A

This was based on the theme learner-engagement and learner-commitment in their respective classrooms. It was found that teacher #1, teacher #2 and teacher #3 were able to engage and control their teaching environment. Learners fully participated in their lessons. Although teacher#1 rated learners on scale of 3 out 10 on the questionnaires, during observation the researcher noticed that learners were engaged fully and their participation was pleasing during the lesson. Hence the interviews were conducted to probed the reasoning behind the contrast. When teacher#1 was interviewed, he claimed that normally not all learners participate and pointed out that it required force to make certain learners provide answers.

Both teachers and learners found the tasks to be interesting. The designed layout of the classroom and nature of engagement Intrinsic motivational aspects involved

learners' perceived individual interests and enjoyment. Some learners' participation and commitment perceived the tasks to be interesting and some felt that the tasks improved their passion for Physical Sciences.

During the observations, the researcher witnessed what these teachers suggested on the questionnaires. Other observed contributors to the improvement of quality of results apart from learner engagement and learner commitment, were: teacher mentoring during tasks, collaborative work and increased motivation that resulted in the improved commitment and serious participation. The interaction amongst students themselves and with the teachers improves the performance in tasks, (Slater 2011) According to the statement it is clear that learners are likely to achieve better or improve their quality results if human support, such as peer or mentor, is available to the learners during lessons and learning.

Another contributing factor to learner engagement and learner commitment in the lesson was the introduction of PHET simulation and Experimental approach during the lesson. Learners in school B were kept focused on the lessons through the introduction of Experimental work. Teacher #2 allowed learners to use apparatus, taught them how handle them and make their deductions on what they were doing. Learners were excited about the approach and many shifted their focus of listening to the teacher to discovering on their own. However, the teacher was still in control providing clear instructions and assistance.

Teacher #3 in school C, on learner-participation and learner-commitment, rated learners on a scale of up to 80% in the classroom compared with teacher #1 and teacher #2. Although his lesson took the revision form, the researcher observed that learners' interest was the priority through making learners active participants. The participation and response to questions became intense because learners were monitored and assisted. Debates and arguments arose during the lesson, with teacher #3 moving around to cater for all learners in the classroom. The lesson was characterized by learners' debates and comparisons of responses.

4.6.2 Teaching and learner assessment strategies in School A

In school A, the lesson began with an oral assessment approach. This form of assessment was randomly done. Learners choose from the definition of physical sciences' terminologies they have learnt in a previous lesson. During the lesson the teacher would pause and ask questions. The researcher observed a random selection of learners responding to questions. What amazed the researcher was that teacher #2 would ignore purposefully learners whose hands were raised and pin-point learners who had not raised their hands. When asked during the interview he said, "*All learners in the classroom must be put to task, sometimes learners know the answer but refused to participate in class*". Assessment is a priority to all learners in the classroom.

Teacher #1 gave learners a designed worksheet as an on-going assessment to examine the progress. This form of assessment was strictly individual to consolidate the lesson. Furthermore, the teacher was always available for assistance. The lesson ended with assessment, learners were given homework and were advised to complete it. It is clear that definition plays an important role in understanding the concept of Physical Sciences, so that is why the teacher made it a priority to assess terminologies always.

4.6.3 Lesson Planning to deliver a specific lesson in school A

During the observation the researcher noticed that teacher #1 thoroughly planned how to deliver the lesson. The planning of the lesson was done on the previous day. The lesson appeared to take the direction in which the teacher was hoping to achieve. All that was needed for the lesson was used to maximize understanding and cater to all learners in class. Another important noticeable factor was the understanding between the teacher and learners. Learners appeared to know exactly what their teacher required from them. During the monitoring of workbook and recitation of terminology, learners' response was positive.

These learners were not requested to write corrections but volunteered with enthusiasm and competition amongst them appeared to be the motivator. The time set aside for the corrections was limited for a certain period and structured to accommodate all learners' interests. During the interview it was revealed that planning plays an important role for him to see progress and cater for different needs of learners.

He reasoned that planning early plays a key role in preparations and testing of equipment so that the lessons run smoothly.

4.6.4 Learner engagement and Learner commitment in the classroom B

Teacher #2 captured learners' attention and participation through the definition of terminologies. The variation of strategy done during the lesson also contributed to the success of the lesson presented. The researcher observed that certain learners were enjoying the process of Physical science terminology definitions with constant encouragement from teacher #2. After the introduction of the lesson, most learners in school B became more attentive, enthusiastic and part of the lesson after the introduction of an experimental approach.

Learners in school B were re-arranged into groups of fives during the experiment. The researcher observed that teacher #2 had already made her choice in the selection of groups. Learners quietly rushed into their respective groups and started fiddling with equipment without being told what to do. Teacher #2 only gave them the freedom to choose their group leaders and provided them with worksheets. He read the instructions to them, explaining what was expected of them during the activity. Learners' attention was fully applied to the instructions. The teacher captured participation by requesting them to present and explain their findings on the experiment.

Teacher #2 utilized the space in the classroom to commit learners to the lesson. He also engages learners in classroom through an experimental journey. The teacher made the lesson more interesting not only to relay the content but to also motivate and encouraging all learners in the classroom. The researcher feels that if one needs to keep all learners glued to the lesson, the teacher must vary the lesson. Varying not only keeps learners' engagement and commitment but maintains discipline and curiosity to know.

Clarity and consolidation were given by teachers through comparison of concepts brought forward. Learners' explanations and claims categorized into accurate concepts and misconceptions arose during their discussion. These teachers corrected the misconceptions by allowing learners to use their PHET simulation in the case of school B.

4.6.5 The planning of a specific lesson's concepts in School B

The researcher noticed that the planning of the lesson in school A was well considered. All the material for a lesson was available in the form of the lesson charts and illustrations for Physical Sciences used when necessary by learners, when they find difficulty in answering questions. The teacher used the lesson-planning template as the guide towards achieving what she intended to achieve. The arrangement of learners into groups to cater for all learners was noted. The researcher also noted the preparation of material and equipment to be used prior to the lesson. The lesson was well structured in terms of time, where various forms of teaching were accommodated.

The usage of equipment for experiments and PHET simulations was point out and they comprehended the lesson. The teacher gave thought to varying his lesson to achieve the purpose. Worksheets were prepared beforehand and added to the smooth running of the lesson. The lesson followed certain intervals according to time and her lesson template. Teacher #2 knew when to change and introduce different strategies to the lesson.

The choice of questions used for the worksheet were developed from the National Senior Certificate (NSC) examination. These questions had been prepared and put on top of the desk for easy accessibility. The lesson paused sometimes for questions and opportunity for learners to work out the small exercises, like answering questions. However, the teacher was very cautious about the time. A homework exercise was also issued at the end of the lesson.

4.6.6 Teaching and learner assessment strategies in school B

In school B, the lesson began with Oral assessment approach technique. This form of assessment is conducted randomly; learners choose from the pool? of definitions of physical sciences' terminologies they have learnt in previous lessons. During the lesson the teacher would pause and ask questions on the lesson. The researcher observed random selection of learners to respond to questions.

Teacher #2 gave learners a designed worksheet as an on-going assessment to examine the progress. This form of assessment was strictly individual assessment to consolidate the lesson. Furthermore, the teacher was always available for assistance.

The lesson ended with assessment, learners were given homework and were advised to do their homework.

4.6.7 Learner engagement and learner commitment in classroom C

The lesson in school C was in the form of revision. The researcher viewed teacher #3 as somebody who wanted learners to reflect on the June examination response. Teacher #3 began the lesson by pointing out names to catch the attention of the learners. The teacher had asked the learners to take out their question papers and notebook. The researcher found that the teacher used fear to control the attitude and to maintain discipline in the classroom. The researcher also noted that the teacher did most of the talking at first. However, as the lesson progressed learners' participation and commitment were required. The researcher saw that the teacher had prepared for the discussion and debate which later took place. During the lesson it was also observed learners were allowed to consult their peers.

The researcher noted that the teacher had targeted all the students to participate, because when questions were posed he directed the questions to specific learners. During the lesson movement played a key role in assisting learners who found it difficult to understand the question. The participation of learners grew after all learners finished writing their responses and were afforded chances to present and explain their answers on the chalkboard. Arguments and discussions about the lesson had increased and made the lesson alive and interesting. The reason for arguments and discussion increasing was that learners were given a chance to correct and rectify the misconceptions amongst each other.

According to what the researcher noticed, the teacher would constantly intervene because learners wanted to talk or share their views at the same time. Even the quiet learners wanted to come out to share their responses rather than being forced to do so. Observation had called for the researcher to make a judgement that learning is taking place. During this process the educator would intervene in the arguments after two learners would have given their explanation. This intervention would be done to cement who was on point and what was wrong with some of the arguments. The teachers would sometimes refer learners to their textbook, citing the exact paper where learners should have based their arguments. The researcher believed that learner engagement and commitment were done to the optimum best. It was also perceived

that controlled or structured learner-centered approach yielded positive results. This lesson has been a revelation that learners learn through experience and several attempts.

4.6.7 The planning of a specific lesson's concepts in School C

The data collected from the study revealed that teacher #3 had planned for the lesson, although the resources for the lesson were not enough for the session. Teacher #3 reminded learners to share their resources to be used in the lesson. This session targeted only the multiple choice questions in the question paper. This was done purposely for effective management of time. The resources and material planned for this activity was not enough and had a negative impact. Certain learners had serious challenges using the textbook as the resource. To use only textbooks to offer support to learners in need was not enough. Teacher #3 in the study used limited resources. In addition, those resources were not the most effective for certain learners.

Learners can be excluded from the learning process by lack of planning and lack of resources. Teachers' planning is to provide adequate and relevant resources available (Mohay, H. & Reid, E. (2006). The researcher would like to emphasize the dangers of not planning properly and the use of limited resources. They hinder the smooth running of the lesson. The researcher observed that the educator supported the claims on the questionnaire that says he offered a variety of resources during the lesson. The researcher discovered that the lesson was planned purposely to enforce and teach learners how to use their textbooks.

4.6.8 Teaching and learner assessment strategies

The researcher witnessed learner-assessment type of lesson. This type of assessment may well not have addressed the three types of classroom assessment. This study revealed only one type of assessment, which is formative assessment. Summative assessment and assessment for programme evaluation were noticeably left out. Formative assessment seeks to assist and provide a diagnostic feedback to teachers and learners during the course of instruction. At the start of the lesson learners found it difficult to engage in the discussion. Learners became more vocal and enthusiastic after the teacher allowed them to discuss and explain their responses.

According to the definition of formative assessment, indeed, teacher #3's objective to the assessment was immediate feedback. The researcher thinks this was done to allow learners to reflect on their previous assessment which was their June examinations. The researcher also believes that the assessment strategy used lacks the ability to improve learners' scientific enquiry. This only measures certain kinds of conceptual knowledge to be achieved in learning. The researcher considers this form of assessment to lack learners' ability to design and execute all steps involved in carrying out a scientific investigation. The efforts have been made to ensure that all teachers undertake regular in-service training so that they remain up to date with the curriculum content knowledge, continue to develop their classroom organization and teaching assessment strategies, and, where appropriate, their leadership roles.

4.7 CONCLUSION

This chapter presented, analysed and discussed the data collected. Different themes were identified that contributed to the implementation of teaching strategies to improve the achievement of quality results in physical sciences. From the data it is evident that various factors contribute to the improvement and achievement of quality results at these specified schools.

UNIVERSITY *of the*
WESTERN CAPE

CHAPTER 5

SUMMARY AND CONCLUSION

5.1 INTRODUCTION

This chapter presents the summary of the finding discussions and conclusion of the research study. Furthermore, this chapter provides recommendations that may help to improve the implementation of different teaching strategies to improve quality achievement in physical sciences. The aim of this chapter is to describe the findings and conclusions based on the discussions of results.

5.2 OVERVIEW OF THE SCOPE OF THE THESIS

5.2.1 Introduction

This research, concerning “the teaching strategies that can be employed to achieve quality results in Physical Sciences”, was conducted in three rural schools in a district in the Eastern Cape. The key objective of the study was to present an awareness concerning teaching strategies that can be employed in a lesson in order to accomplish quality of results in physical sciences. A second objective was to highlight the significance of using a variety of different strategies in order to support learners to achieve quality of results at Grade 12. Lastly, the study was conducted to provide a foundation for further research into strategies that can be employed to achieve quality of results.

The main research question that guided the study was “What teaching strategies can be employed by schools to improve quality of passes in Physical Sciences?”. This question leads to the problem identified, namely “researcher’s school lacks quality achievement of Grade 12 results in Physical Sciences” although the quantity of pass had shown significant improvement.

5.2.2 Literature Review

This section of the research study is grounded within the theoretical framework called reflective practice and reflection. Dewey (1933) believes that reflection and reflective practice can be more effective if it leads a teacher to make meaning from the situation in which he /she can enhance better understanding of the concept. He further argues that a teacher should see and understand the practice setting from a variety of viewpoints.

Patil (2013) concurs with Dewey by highlighting that reflective practice is the means by which one engages in a process of on-going learning and developmental awareness, whilst paying attention to the practical values and theories. This theoretical framework enabled the researcher to look beyond his lesson activities to address the challenges of inability to achieve quality of grade 12 physical sciences. The researcher agrees with Dewey and Patil, that a teacher needs to do an introspection and go beyond his/her limitations to find a range of ways to address challenges of the lesson.

5.2.3 Methodology

This research study adopted both a qualitative and quantitative research methodology, because observation focus was to observe the ways these teachers conduct and carry out their lessons. Yet again, it was necessary to understand their opinions, attitudes, views and perceptions of the above-mentioned participants towards their roles and contribution to the attainment of the quality of results.

Three techniques of collecting data were employed in this study research. Observation schedules, questionnaires and unstructured interviews were used as research instruments to collect data. Three teachers were sampled purposely from three different schools based on the quality results achieved in Physical Sciences. The researcher followed detailed four steps to collect data.

5.2.4 Results and Discussion

Physical sciences teachers should make it a priority and their responsibility to prepare learners through the curriculum provision as global citizens who are capable. Also, the success of the subject should not be limited to only learner's academic performance

but basic life skills and human rights issues are paramount in developing the whole child and creating the foundation for successful education.

This study has revealed that employment of different teaching methods by teachers can have a positive impact on quality learner-achievement. Results of the study indicate that early in the lesson, a learner-centred approach and different approaches to teaching yield greater learner participation. Lessons are interesting and learners become more interested. Literature presented that there is a relationship between the use of a variety of teaching strategies and performance of learners. The researcher focused on the support given to learners and teaching strategies employed by teachers. The results of the study indicate that when more teaching strategies are employed and support given by teachers, learners become more curious and motivated to excel. Moreover, the teachers rated as above average on more strategies employed in the questionnaire. Therefore, one can conclude that a variety of teaching methods indeed are important factors that contribute to learner commitment and achievement of results.

5.3 MAJOR FINDINGS OF THE STUDY

Base on the findings, the conclusions to the study are drawn. A number of aspects has been acknowledged as reasons to quality achievement of Physical Sciences in the three schools under investigation. These aspects include peer assistance, mentoring of learners, learner-centred approach, variation of activities, extra lessons for learners, lesson planning of the lessons, diverse assessment and teacher motivation.

5.3.1 Peer assistance

This study indicates that learning is best achieved in a social setting where two or more individuals engage in a dialogue about a topic. If learners assist each other, the interaction promotes learning and improved reasoning by exposing learners to diverse and challenging ideas.

5.3.2 Mentoring of learners

The results of the study revealed that monitoring of learners was at the forefront to making sure that learners progress in learning. Bush et al. (2008) agrees that evaluation is another important tool to enhance the quality of teaching and learning.

They also claim that classroom practice may be judged by monitoring and evaluation. Monitoring of learners and learning have built confidence and interest to many in the classroom.

5.3.3 Learner-centred approach

This study has shown that a learner-centred teaching approach has been designed around learners' needs and intended at finding a general context in learner's understanding. This approach demands that every portion of teaching and support to learning are more tailored to suit individual needs. The three schools have demonstrated learner-centred methods, and permit for the dynamic involvement of learners. The is recognition for the fact that teachers are not always successful in meeting the needs of all learners; however, in this study one could confidently conclude that all learners were involved and their attitudes towards the subject have been affected positively as the data illustrate.

5.3.5 Extra lessons for learners

Based on questionnaires it has been found all three teachers do offer extra classes, although one of the schools offered extra classes to learners who experienced difficulty. Extra lessons were employed as teaching strategies to improve the achievement of Grade 12 results. In this study it was discovered that extra-lessons were conducted to accommodate learners who have challenges in Physical sciences

5.3.6 Lesson planning

Good planning necessitates much time and tactical thinking. With respect to teacher development, effective planning played an important role in the outcomes of the study. The study indicates that the teachers spent their time and energy in planning, and as a result, displayed good progress as this impacted positively on the three teachers and learners' perceptions of their roles and responsibilities to ensure that their educational outcomes were met.

5.3.7 Diverse assessment

Assessment plays a fundamental role in curriculum execution as it assists in establishing learning difficulties, tracks learners' development, affords feedback to learners, affords evidence of learners' level of achievement. Kelly (2004) claims that it is of the principle of noble teaching that one ought to be persistently attempting to

measure the levels of pupils' learning in order to lead them to further development. This study indicates that to detect learning difficulties or problems at the early stages, teachers need to diversify their assessment. The planning of the lesson will inform the assessment of learners. The study reveals that various teaching strategies used allow learners to develop a sense of ownership in learning.

5.3.8 Teacher motivation

The results point out that the three teachers have continually worked towards inspiring learners to become keen and motivated learners. According to Parker (2006), such learners are involved, active participants in their individual learning. Rothstein and Santana (2011) put an emphasis on the claims made by Parker that teachers have a responsibility to inspire learners to ask questions and be question-driven instead of answer-driven. This study has demonstrated that teachers strive to motivate learners. During the lessons performance assessment tasks were observed to provide a rationale for practical activities. There was frequent use of experimental activities as activities to learning, to assessment activities for a combination of abilities and skills. These activities were observed to have a motivating effect on learning. Learners' participation and commitment level and quality increased with this type of motivation,

5.4 IMPLICATION OF THE STUDY

The major implication of this study is that an improvement in learners' results requires a commitment by teachers to go beyond their normal teaching hours. This is especially true in the three rural schools in this study. The quality of the results can only improve if the teachers are prepared to try various strategies to draw the interest of learners.

Another implication of the study is that a well-prepared teacher could have a greater influence on learner achievement. This may sometimes be stronger than the influences of background factors, such as poverty, language background and minority status.

The findings of the study have implications for teachers and learners. The study highlights the role of reflection on their everyday teaching and how teachers could use various strategies, such as practical work and various other ICT resources available, to make learners more interested in their subject. This is especially true of Physical Sciences in the three schools. It will help the teachers, both at primary and high school

level, to achieve more quality results in sciences. This will assist teachers to engage in self-study and reflection on their engagement in different teaching strategies to improve learning.

Teachers must be willing to transform their roles and classroom practices. They might require a change of previously held approaches and opinions before they can successfully implement the required changes. Teachers should also reflect on curriculum reform in South African education and understand the significant role they play in its effective implementation.

5.5 LIMITATIONS OF THE STUDY

This research was restricted to limitations that should be acknowledged. This study is limited only to three schools within the circuit of Ntabethemba. Additionally, that might have limited the generalization of the findings to other schools. Bias may perhaps have transpired as the researcher is a teacher and the respondents are his colleagues. In an attempt to reduce bias, the researcher involved and interviewed respondents in interpretation of the questions that were asked and the verification of the data. An added limitation of this study was that there is insufficient literature available on teaching strategies to be employed in order to achieve quality of results in Physical Sciences.

5.6 RECOMMENDATIONS

First, I recommend that additional studies should be undertaken in rural and semi-rural schools with diverse backgrounds to obtain a more representative picture of the contexts in which learners would prefer to deal with Physical Sciences in the Eastern Cape. These learners might have different backgrounds and contextual preferences with regard to their socio-economic backgrounds. This points to the fact that all of them sit for the same examination regardless of their backgrounds.

A study that would look at many factors affecting the quality achievement of results needs to be considered. The researcher had limited time or could only carry observations once because of time and financial limitations. Therefore, the

recommendation is that further studies should be undertaken to investigate the impact of management of the school and discipline within the schools

In order to improve the pass rate in the Eastern Cape, representatives of the stakeholders in the Department of Education, should visit the school and create platforms for those teachers to share their successes. This should be a continuous process to educate teachers to reflect on their lessons to improve the quality of the Physical Science matriculation results.



REFERENCES

- Anderson, G. (1998). *Fundamentals of Educational Research*. London: Routledge Falmer.
- Axinn, W., & Pearce, Lisa.D. (2006). *Mixed Method Data Collection Strategies*. New York: Cambridge University Press.
- Babbie, E., Mouton, J., Vorster, P., & Prozesky. (2015). *The Practice of Social Research*. Cape Town: Oxford University Press Southern Africa.
- Baker, T. (1994). *Doing Social research*. New York: McGraw-Hill inc.
- Barnett, R. (1994). *the limits of competence, knowledge, higher and societ*. Buckingham: SRHE and and The Open univesity Press.
- Best, J., & Kahn, J.V. (1993). *Research in education* (7 ed.). New Dehli: Pretice Hall.
- Bless, C., & Higson-smith, Q. (1995). *Fundamentals of Social Research Methods: An African Perspective*. Cape Town: Creda Press.
- Borg, W., & Gall, D.M. (1989). *Educational Research. An inroduction*. The university of Michigan: Longman.
- Boud , D., Keogh, R., & Walker, D. (1985). "Promoting Reflection in Learning: a model". *Reflection : turning experience into learning, edited by: Boud, D., Keogh, R and walker, D.*, 18-40.
- Boud, D. a. (1983). Reflective learning: Key to Learning from experience. *Journal of Humanistic Psychology* 123, (2), 99-117.
- Brewster, C., Carey, L., Dowling, P., Grobler , P., Holland , P., & & Warnich, S. (2003). *contemporary issues in human resource management*. Cape Town: Oxford Press.
- Brookfield , D. S. (1995). *Becoming a Rritical Reflective Teacher*. San Francisco: Wiley.
- Butler , J. (1996). Professional Development:.. *Practice as Text, reflection as process, and as Locus*, 40(3), 265-283.
- Chokwe, J., & Lephala, K. (2011). *Academic writing in English Secondary Language Contexts: Perceptions and Experiences of fisrt -year university, tutors and leactures*. Pretoria: unisa.
- Cohen, L., Manion, L, & Morisson, K. (2007). *Research methods in education*. New York, NY, US: Routledge/Taylo & Francis Group.
- Cozby, P. (2001). *Methods in Behavioural Research* (7 ed.). London: Mayfield Publishing.

- Darling-Hammond, L., & McLaughlin, M. W. (1995). Policies that Support Development in an Era of Reform. *Phi Delta Kappan*, 597-604.
- Day, C. (1999). *Developing Teachers: The challenges of Lifelong Learning. Educational Change and Development series*. London: Falmer Press.
- Dewey, J. (1933). *How we Think. A restatement of the relation of reflective thinking to the educative process*. Boston: D.C Heath.
- Dhurumraj, T. (2013). *Contributory factors to poor learner performance in Physical Sciences in KwaZulu Natal Province with special reference to schools in Pinetown District*. Pretoria : University of South Africa.
- Education, C. f. (2004). *Nobody's Fault everyone's problem. Status of mathematics and science in South Africa schools*. Johannesburg: CDE.
- Education, C. f. (2004). *Nobody's fault. everone 's problem. Status of mathematics and sciences in South African schools*. Johannesburg: CDE.
- Education, D. o. (2009). *Report of the Task Team Team for for the Reviw of the Implementation of the National Curriculum Statement. Final Repor*. Pretoria: Goverment Printers. Retrieved March 12, 2011, from <http://www.pmg.org.za/report/20091117-department-basic-education-task-team-briefing/>
- education, D. o. (2016). *Nationa Senior Certicificate Schools Subject Report*. Pretoria.
- Erdemir, A. O., Gaban,O, & Uzuntiryaki, E. (2000). Freshman Students' misconceptions in chemical equilibrium. *Hacettepe university Egitim Fakuttesi Dergisi*, 18(1), 79-84.
- Erdimr, S., Geban, O, & Uzuntiryaki, E. (2000). Freshman students's misconceptions in chemical equilibrium. *Hacettepe Universitesi Egitim Fakuttesi Dergisi*, 18(1), 78-84.
- Ferraro, J. M. (2000). *Reflective Practice and professional developmen*. Washington Dc: ERIC Digest.
- Fonseca, M. B. (2003). From student at risk to accademically successful students: A model for reform in the international context. *Lusiada Psicologia*, 1(1), 211-277.
- Fraenkel, J., & Wallen, N.E. (2000). *How to design and evaluate educational research*. . New York: McGraw.

- Fricke , I., Horak, E., Meyer , L., & van Lingen, N. (2008). Lessons from a Mathematics and Science intervention programme in Tswane township Schools. *South African journal of Higher Education*, 22, 67-77.
- Fullan, M. (2005). *Leadership and sustainability: system Thinkers in Action* (pp 1-27). thousand Oaks, CA: Corwin Press.
- Gardner, K. .. (2009). Student and faculty attributions of attrition in higher and low - completing doctoral programs in the United States. *Higher Education*, 13(4), 347-368.
- Gay, L., & Airasian. (2003). *Educational research: competencies for analysis and application* (7 ed.). Uppaer Saddler River: Pearson.
- Glatter, R., Preedy, M, Riches,C, & Masterton, M. (1998). *Understanding School Management*. Milton Keynes: Open University Press.
- Greenwood, J. (1993). reflective practice a critique of the work of Argyris & Schon. *journal Of Advanced Nursing* 19, 1183-1187.
- Group, P. M. (2011, 09 13). Mathematics and Science Interventions: Department of Basic and Higher Education, Science and Technology Briefings. Cape Town, Western Cape.
- Hamza K.M. (2012, 08 19). distractions in the school science laboratory. (Corigan.D, Ed.) *Research in science education*, 43(4), 1477-1499.
- Hargreaves, A. (1998). The Emotional Practice of Teaching. *Tecahing and Teacher Education*, 4(8), 835-854.
- Harris, A. (1998). Effective Teaching: A review of the literature. *School Leadership & management* (, 18(2), 169-183.
- Hatch, J. (2002). *Doing Qualitative Reseach In Education Settings*. Albany, New York: State University of New York Press.
- Hawkins, F. (1997). *Journey with Children: The autobiography of a teacher*. boulder,CO: University Press.
- Holton, E., & Burnett, M.F. (1997). Human resource development research handbook:. In R. Swanson, & E. Holton, *Quantitative research methods* (III ed., pp. 65-87). San Franciosco: Berrett-Koehler.
- Jacobs , M. (2000). *Curriculum Design*. In Jacobs, M., Vkalisa, N., & Gawe, N. (eds) *teaching -learning Dynamics* . Cape town: Heinemann.
- Jarvis , P. (1992). Reflective practice and nursing. *Nursing Education Today*, 12(3), 174-181.

- Jeanne Kriek, Diane Grayson. (2009). A Holistic Professional Development model for South African physical sciences teachers. *South African Journal of Education*, 185-203.
- Jesuina, M., & Joseph, E.C. (2006). Secondary student perceptions of factors affecting failure in science in Portugal. *Eurasia Journal of Mathematics, Science and Technology Education*, 2(2).
- Johnson, B., & Christensen, L. (2010). *EDUCATIONAL RESEARCH: Quantitative, Qualitative, and Mixed Approaches* (4 ed.). Thousand Oaks, California: Sage Publications, Inc.
- Johnson, B., & Christensen, L. (n.d.). *Educational Research*.
- Joorst, R. (2010, November 2011/10/06). *Magister Educations-Med(educational psychology)*. Retrieved from etd.uwc.ac.za: <http://hdl.handle.net/11394/2604>
- Kahle, J. (1999, October 30). *Teacher professional development: Does it make a difference in Student learning?* Washington DC: Testimony to the US House of Representative Committee on Science. Retrieved from <http://go.abc.edu/k/kahle.html>.
- Kelly, A. (2003). Research as Design. *Educational Researcher*, 32, 3-4.
- Kelly, A. (2004). *The Curriculum theory and practice* (5 ed.). London: Sage Publications.
- Kelly, A. (2004). *The Curriculum Theory and Practice*. London: Sage Publications.
- Kelly, G. (2007). Discourse in science classrooms. In K. A. Sandra, & N. Laderman (Ed.), *Handbook of Research on Science Education* (pp. 443-469). Mahwah, New Jersey: Lawrence Erlbaum Associates, Inc.
- Killion, J. P., & Todnem, G. R. (1991). A process for building theory. *Educational Leadership*, 48(6), 14-16.
- Kolb, D. A., & Fry, R. E. (1975). Toward an applied theory of experiential. *Theories of Group Process*, 33-58.
- Korthagen, F. (2004). In search of the essence of a good teacher: towards a more holistic approach in teacher education. *Teaching and Teacher Education*, 77-79.
- Kosnik, C. & (2001). Reflection-in-action: in defence of thoughtful thinking. *Curriculum Inquiry*, 31(2), 217-227.
- Larrivee, B. (2008). Meeting the challenge of preparing reflective Practitioners. *The New Educator*, 4(2), 1-20.

- Leachy, R., & Corcoran, C. (1996). Encouraging Reflective Practitioners: Connecting classroom to Fieldwork. *Journal of Research and Development in Education*, 29(2), 104-114.
- Leedy, P. (1997). *Practical Research: Planning and Design*. New Jersey: Prentice-Hall, Inc.
- Leithwood, K. e. (2006). *Success school leadership: What it is and how it influences pupils learning*. Nottingham: NCSL & DfES.
- Lemalieu, P., Roy, P., & Foss, H. (1997). through a lens clearly: a model to Guide the instructional leadership of principal. *Urban education*, No. 31, pp, 582-608.
- Loughran, J., & Russell, T. (Eds.). (1997). Teaching about Teaching: principles and Practice . *Understanding Pre-service Trainee's Perceptions of their Teacher Training Experience* (pp. 57-70). London, Washington: Falmer Press.
- Maykut, P., & Morehouse, R. (1994). *Beginning qualitative research: A philosophic and practical guide*. London: Falmer Press.
- Merizow, J. (1981). A critical theory of adult learning and Education, *Adult Education*, 32(1), 3-24.
- Miller, G. &. (1997). *context and method in quality research*. London: sage Publications.
- Mji, A., & Makgato, M. (2006). Factors associated with school learners' poor performance: A spot light on mathematics and physical science. *South African journal of education*, 26(2), 253-266.
- Mkhombo, A. (2011). *Factors influencing performance in the learning of isiZulu at Ekurheleni South District Secondary Schools*. Pretoria: University of South Africa.
- Mohay, H., & Reid, E. (2006). The inclusion of children with a disability in child care: the influence of experience, training and attitudes of childhood Education. *Australian Journal of early childhood Education*, 3(1), 35-42.
- Mohay, H., & Reid, E. (2006). The inclusion of children with a disability in child care: the influence of experience, training and attitude of childcare staff. *Australian Journal of early childhood Education*, 3(1), 35-42.
- Mohay, H., & Reid, M. (2006). The inclusion of Children with a disability in Child Care: the influence of Experience, Training and Attitudes of Childcare Staff. *Early Childhood Education*, 35-42.
- Moon, J. (200). *Reflection in learning and Professional Development*. London: Kopan Page.

- Nakielski. (2005). Raynor M, Mashall J, Sullivan A (eds) Decision Making in Midwifery. *The reflective practitioner*. In, 143-156.
- Neville, B., Willis, P, & Edwards, M. (1994). *Qualitative research in Adult Education*. Delaide: University of South Africa.
- Osterman, K. &. (1993). Reflective Practice for educators. *improving schooling through professional development*.
- Osterman, K. a. (1993). Improving schooling through professional development. *Reflective practice for educators*..
- Parker, D. (2006). Grade 10-12 Mathematics curriculum reform in South Africa: A textual analysis of new national curriculum Statements. *African Journal of Research in SMT Education*, 10(0), 59-73.
- Patil, J. (2013). REFLECTIVE PRACTICE IN EDUCATION. *Global Online Electronic International Interdisciplinary Resarch Journal*, II, 2278-5639.
- Polanyi. (2004). science and Conscience. *New Perspectives Quartely*, 21, 21-24.
- Pollad, A. a. (2008). *Reflective teaching: evidence -informed professional practice*. London: Continuum International Publishing Group.
- Pollard, A., Anderson,J, Maddock,M, Swaffield,S, Warin,J, & warwick,P. (2008). *Reflective teaching: evidence-informed professional practice* (3 ed.). London: continuum International Publishing Group.
- Qing, X. U. (2009). Relationship between Burnout and Reflective Teaching among EFL Teachers. *International Journal of foreign Language teaching and Research*, 2, 35-40.
- Quinlan, K. M., & Akerlind, G.S. (2000). factors affecting departmental peer collaboration for faculty development: Two cases in context. *Higher Education*, 10, 23-52.
- Rainer, T. (1978). *The new diary: how to use a journal for self-guidance and expanded creativity*. Los Angeles, CA: J.P Tarcher .
- Rothstein, D., & Santana , L. (2011). *Make one change: Teach students to ask their questions* . Cambridge: Harvard Education Press.
- Rothstein, D., & Santana, L. (2011). *Make Just One Change: Teach Students to Ask Their Questions*. Cambridge: Mass: Harvard Education Press.
- S.M, M. (2011, 08 15). Retrieved from <http://handle.net/10500/6084>
- Sagor, R., & Barnett, B.G. (1994). *The TQE Principal: A transformed leader*. . California: Corwin Press, Inc. A sage Publications Company.

- Schon, D. (1983). *The Reflective Practitioner, how Professional think in Action*. New York: Basic Books.
- Schumacher, S., & MacMillan, J. (1993). *Research in education* (3rd ed.). New York: Harper Collins College publishers.
- Seidman, I. (1991). *interviewing as qualitative research: A guide for researchers in education and social sciences* . New York, NY, US: Teachers College Press.
- Sendur, G., Toprak, M , & Sahin Pekmez, E. (2010, November 11-13). Analyzing of students' misconceptions about chemical equilibrium. *Pape presented at the international Conference on New Trend in Education and thier implications*, 11-13. Held at Antalya, , Turkey.
- Sendur, G., Toprak, M, & Sahin Pekmez, E. (2010, November 11-13). Analyzing of studens' misconceptions about chemical equilibrium. *Paper presented at the internatinal conference on new Trends in Education and their implications*. held at Antalya , turkey.
- Servaas van der berg, Stephan Taylor, Martin Gustafsson, Nicholas Spaul, Paula Armstrong. (2011). *Improving Education Quality in South Africa*. stellenbosch: Stellenbosch.
- Shulman, L. (1987). Knowledge and teaching. *foundations of the new Reform'*, 57, 1-22.
- Slater, G. L. (2011). factors that Encourage Students Engagement: Insights from a Case Study of 'Fisrt Time' Students in a New Zealand University. *Journal of University Teaching & Learning Practice*, 8(1).
- Smyth , J. (1992). Teacher's work and the politics of reflection. *American Research Journal*, 29(2), 267-300.
- Spaul, N. (2013). *South Africa's Education Crisis: The quality of education in South Africa !994-2011*. Johhanesburg : Centre for development & Enterprise.
- Spaul, N. (2013). *South Africa's Education Crisis: The quality uf education in South Africa 1994-2011*. Johannesburg: CENTRE FOR DEVELOPMENT & ENTERPRISE.
- Takona, J. (2002). *Pre-Service Teacher Portfolio Development*. Lincoln,NE: Writers Club Press.
- Thomas, R. M. (2003). Blending Qualitative and Quantitative Research Methods in These and Dissertations. *Journal of Mixed Methods Research*, 1(3), 295-299.

- Tucker , P. D., Stronge , J. H., & Gareis , C. (2002). *Handbook Portfolios for Evaluation and Professional Development and Professional Development*. Larchmont, NY: Eye on Education.
- Tuckman. (1994). *Conducting Educational Research*. Michigan: Harcourt Brace College.
- Van Manen, M. (1991). The Tact of Teaching. *The Meaning of Pedagogical Thoughtfulness*, 1(1), 33-50.
- Waltz C, Strickland, O.L, & Lenz, E. (2010). *Measurement in Nursing and Health Research* (4 ed.). New York, NY: Springer Publishing.
- Welman, J., Kruger, F, & Mitchell, B. (2010). *Research Methodology*, (3 ed.). Cape Town: Oxford University Press.
- Whitte, G. (2011, March 28). result. Johannesburg, Gauteng, South Africa: time lives. Retrieved from <https://www.timeslive.co.za/news/south-africa/2011-03-28-dinaledi-school-project-on-track-education-department/>
- York-Barr, J., Sommers , W. A., Ghere, G. S., & Montie , J. (2001). *Reflective Practice to improve Schools: An Action guide for educators*. thousand Oaks, CA: Corwin Press.
- Zeichner, K. &. (1987). Teaching Student teachers to Reflect. *Harvard Educational Review*, 23-49.
- Zeichner, K. &. (1996). *Reflective teaching: An introduction*. Mahwah: Laurance Earlbaum Associates .
- Zeichner, K. (1987). Preparing Reflective Teacher: an Overview of instructional Strategies which have been employed in preservice teacher education. *International Journal of education Research*, 565-576.
- Zembylas, M. (2007). Emotional Ecology: The intersection of emotional Knowledge and pedagogical content knowledge in teaching. *Teaching and Teacher Education*, 23(4), 355-367.

Appendix: Ethical Documents and Clearance

Appendix 1: Letters of Consent

XXX 45
XXX Ntabathemba village
5330
2015

Principal of YYYY
District XXXXX
Pointview
20xx

Dear Sir

RE: PERMISSION TO CONDUCT RESEARCH

I, Lizo Ntlanganiso, hereby request permission to conduct a research in your school. I am a student at the University of Western Cape studying Masters of Education Degree. The research I wish to carry out is a requirement to fulfil the degree. I pledge and promise not to disrupt any programs of the department and the school. I will use the time I get with the teachers, while I conduct the study, to benefit the teachers and the school. I will work within the framework of the school' and department's disciplinary arrangements. I have also written a letter to the Education Head Office in this regard.

Yours in Education

XXX 45

XXX Ntabathemba village

5330

2015

The Chairperson –Ethics Committee

University of the Western Cape

Bellville

Cape Town ,7493

Dear Sir / Madam

RE: PERMISSION TO CONDUCT RESEARCH

I, Ntlanganiso Lizo, hereby request permission to conduct a research at a school.

I am a student at the University of the Western Cape studying Masters of Education Degree. The research I wish to carry out is a requirement to fulfil the degree.

I pledge and promise not to disrupt any programs of the department and the school. I will work within the framework of the department's disciplinary arrangements and the parents of the learners.

I have also written a letter to the school in this regard. I have a strong belief that the research will benefit the school and other schools that may be affected by the challenge in question.

Yours in Education

UNIVERSITY OF WESTERN CAPE

FACULTY OF EDUCATION

CONSENT FORM

NOTE: This consent form is to be retained by the parent of the learner and the school principal and kept in a secure location. The student may be required to present the original copy to the University of the Western Cape Ethics Committee as evidence that consent has been granted to conduct research at your school.

I, _____, hereby give permission for Lizo Ntlanganiso (MEd) who is a student of the University of the Western Cape and is involved in the planning and implementation of this research project permission to use the material which has been obtained during the course of the research.

I understand that the above research project has been explained and specified and those involved intend to share the research in the form of publications.

I also understand that:

- My participation is a personal decision and entirely voluntary.
- There are no rewards for granting permission.
- I will not be penalised for granting permission.
- I have the right to withdraw my permission at a later stage.
- The content obtained through the interview and questionnaire will only be used for the purpose of this research project.
- My own identity shall remain anonymous.

My signature below indicates my permission to use the material for research



Appendix 2 Questionnaires

Section A: biography information			
indicate your response by marking 'X' in the appropriate space (s)			
1	What is your role in the school		
1.1	Teacher		
1.2	Head of Department		
1.3	Principal		
1.4	Gender: male		
	: female		

2	Indicate your highest academic qualification		
---	--	--	--

SECTION B: RESEARCH QUESTIONS: EDUCATORS.

1. indicate your choice by making use of the following scale

1 strongly agree; 2 agree; 3 disagree; 4 strongly disagree

		1	2	3	4
1.2	Teachers should be provided with in-service training in how to manage their classrooms.				
1.3	Matric improvement strategies have enhanced my competence as a teacher.				
1.4	Teachers should strictly follow work schedules supplied by district office.				
1.5	Many strategies have been successfully implemented in my school				

2 Rate the following statements on a scale of 1 to 10. 1 is poor and 10 is excellent.

		1	2	3	4	5	6	7	8	9	10
2.1	Learners are committed to their studies in the class										
2.2	Learners are able to speak freely in class										
2.3	Learners are disciplined in class										

2.4	The SMT provides material support for teachers in improving quality results											

3. What extra learning sessions do your grade 12 learners receive in your school? (mark with 'X')		
	Mornings before school.	
	Afternoon after school hours	
	On Saturdays	
	During June holidays	
	I only teach during normal school hours	

4. In what ways do you use assessment to inform planning your lessons.....

5. In what ways do you use assessment to inform teaching your lessons.....

Appendix 3: Observation Schedule

TEACHER OBSERVATION

NAME: _____

DATE: _____

SUBJECT KNOWLEDGE AND SUBJECT APPLICATION		
The objectives of the lesson were clearly stated		<u>Comment</u>
The objectives were reflected throughout the lesson.		
Different strategies were used.	<u>Comment</u>	
Teaching strategies, techniques and Classroom Management		
Clear explanation and effective questioning shown.	<u>Yes</u>	<u>No</u>
	<u>Comment</u>	
Management of class discussion	<u>Comment</u>	
Teacher interaction with learners	<u>Comment</u>	
Learner interaction with each other		
Promotion of positive classroom behaviour		

Encouragement of pupil contribution to class discussions		
Presentation of resources classroom displays		
Management of group work		
9. Provision made for differentiation		
Assessment and recording of pupil Progress.		
Use of range of assessment methods		
Additional comments including suggestions for areas: evaluation		

