

UNIVERSITY OF ZULULAND



THESIS

**FOR THE DEGREE OF
DOCTOR OF EDUCATION
IN THE FIELD OF SOCIAL SCIENCE**

WITH THE TITLE:

**PRACTICES AND CHALLENGES FACING PHYSICAL SCIENCE EDUCATORS IN
VUWANI RURAL SCHOOLS IN IMPROVING GRADE 12 RESULTS**

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2020

CANDIDATE`S DECLARATION

This is to acknowledge that I have read the university's policies and rules that underpin postgraduate research. I Baloyi Miringo Samson certify that I complied with their requirements. I, therefore, declare that the research is innovative and free from any form of plagiarism.

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I am satisfied that I have given the candidate the necessary supervision in respect of this thesis and that it meets the university's requirements in respect of a PhD research.

I have read and approved its final version, and it is submitted with my consent.

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DEDICATION

This thesis is dedicated to my wife and children who were always there for me. To friends and colleagues who supported me throughout the study, I salute you. To the Department of Basic Education and stakeholders who care for our country, let us work hard to help the future generation. Their future is in our hands. They deserve the best from us.

ABSTRACT

The quality of Physical Science results in rural areas is a matter of concern. As a developing country, South Africa's focus must be on uplifting the standard of education in rural areas in order to have more skilled people. The study of Physical Science can help improve science skills in our country. The aim of this study was to determine practices and challenges facing Physical Science educators in improving Grade 12 results in Vuwani's rural schools. The study was done qualitatively. Data was collected through interviews and observations. The findings, as based on interviews, indicate that Physical Science educators in Vuwani are faced with challenges such as lack of resources, work overload, lack of support from SMT, insufficient training by the Department of Basic Education when curricula change, overcrowded classes and bad classroom environment. The study also revealed that learners fail because of lack of proper support from parents, lack of discipline and improper use of language of instruction during teaching and learning. Physical Science educators in Vuwani indicated that to improve results, the following strategies could be useful: engage learners in enrichment classes, work as a team, mentor the new comers, give learners more assessment activities, motivate learners and monitor educators' activities through SMT. Findings obtained through classroom teaching observation indicate that educators have challenges with regard to resources, content knowledge, language usage, assessment and feedback provision on activities taught. The study recommends that schools with less learner enrolment should reduce streams in order to lessen workloads on educators. Learners should be assessed regularly to improve performance.

Keywords: Educator Practices, improve results, educator challenges, rural schools, physical science educator.

TABLE OF CONTENTS

CHAPTER ONE: INTRODUCTION AND BACKGROUND OF THE STUDY

1.1. Introduction	8
1.2. Problem statement	13
1.3. Aim of the study	14
1.4. Objectives	14
1.5. Research questions	15
1.6. Clarification of key concepts	15
1.6.1. Educator practices	15
1.6.2. Rural schools	15
1.6.3. Improve results	16
1.6.4. Educator challenges	16
1.6.5. Physical Science Educator	16
1.7. Significance of the study	16
1.8. Research design and methodology	17
1.8.1. Research design	17
1.8.2. Research Methodology	17
1.8.2.1 Population	18
1.8.2.2. Sampling procedure	18
1.8.2.3. Data collection procedure	18
1.8.2.4. Data analysis	19
1.9. Ethical consideration	19
1.10. Resources	20
1.11. Intellectual property and innovation	20
1.12. Harvesting the research	20
1.13. Chapter outline	20

CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction	22
2.2. Quality Education	23
2.3. Legislation: Analysis of policy in rural areas schools	24

2.4. Challenges encountered by Physical Science educators in rural schools	25
2.4.1. Educators workload	25
2.4.2. Curriculum support	26
2.4.3. Curriculum change	27
2.4.4. Resources	28
2.4.5. Classroom environment	29
2.4.6. Overcrowding	29
2.5. Factors affecting the learners performance in Physical Science subjects	30
2.5.1. Home environment	30
2.5.1.1. Socio-economic status	31
2.5.1.2 Parents attitude towards education	31
2.5.1.3. Child headed families	33
2.5.2. School factors	33
2.5.2.1. Discipline	34
2.5.2.2. Language of teaching and learning	35
2.5.2.3. Educators competence	35
2.5.2.4. Absenteeism	36
2.6. Classroom practices	37
2.6.1. Lesson preparation	37
2.6.2. Teaching approaches	37
2.6.2.1. Modelling instruction	38
2.6.2.2. Practicals	38
2.6.3. Assessment	40
2.6.4. Feedback	40
2.7. Strategies used by educators to improve Grade 12 Physical Science results	41
2.7.1. Enrichment classes	42
2.7.2. Teamwork	42
2.7.3. Monitoring	43
2.7.4. Mentoring	44
2.7.5. Motivation	45
2.7.6. Assessment	46
2.8. Learning theories	47
2.8.1. Constructivism	47
2.8.2. Behaviorism	48

2.9. Conclusion	50
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CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

3.1. Introduction	52
3.2. Research questions	52
3.3. Research Methodology	52
3.4. Rationale	53
3.5. Paradigm Approach	54
3.6. Research Design	54
3.7. Qualitative approach	54
3.8. Population of the study	54
3.81. Target population	55
3.8.2. Sampling procedure	55
3.9. Data Collection Procedure	56
3.10. Data analysis	57
3.11. Measures of trustworthiness	57
3.11.1. Credibility	57
3.11.2. Transferability	58
3.11.3. Dependability	58
3.11.4. Confirmability	58
3.11. Ethical consideration	59
3.12. Conclusion	59

CHAPTER FOUR: ANALYSIS, PRESENTATION AND INTERPRETATION OF EMPIRICAL DATA

4.1. Introduction	60
4.2. Respondents personal information	60
4.2.1. Respondents' sex	60
4.2.2. Respondents' age range	61
4.2.3. Educational Qualifications of respondents	62
4.2.4. Respondents teaching experience	62
4.3. Qualitative analysis	63

Theme 1: The challenges facing Grade 12 Physical Science educators in rural schools.	63
Sub-theme 1.1: Lack of resources	63
Sub-theme 1.2. Curriculum change	66
Sub-theme 1.3. Educators workload	67
Sub-theme 1.4. Curriculum support	68
Sub-theme 1.5. Classroom environment	69
Sub-theme 1.6. Overcrowding	70
Theme 2: Factors that affect Grade 12 Physical Science learners' performance at schools in rural areas	71
Sub-theme 2.1. Parents involvement	71
Sub-theme 2.2. Learners' absenteeism	73
Sub-theme 2.3. Learners' discipline	74
Sub-theme 2.4. Learners' commitment in studying	75
Sub-theme 2.5. Qualified for progression learners	77
Sub-theme 2.6. Language of teaching and learning	78
Theme 3: The strategies used by Physical Science educators in improving Physical Science Grade 12 results	79
Sub-theme 3.1. Feedback	79
Sub-theme 3.2. Motivation	80
Sub-theme 3.3. Outsourcing educators	81
Sub-theme 3.4. Extra classes	83
Sub-theme 3.5. Monitoring	84
Sub-theme 3.6. Assessment	85
Theme 4: Classroom teaching practices	86
Sub-theme 4.1. Classroom set up	86
Sub-theme 4.2. Resources	86
Sub-theme 4.3. Educators' preparation	87
Sub-theme 4.4. Educators' content knowledge	87
Sub-theme 4.5. Educators' teaching methods	88
Sub-theme 4.6. Involvement of learners	89
Sub-theme 4.7. Language usage	90
Sub-theme 4.8. Assessment	91
Sub-theme 4.9. Feedback	92

4.4. Conclusion	93
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CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction	94
5.2. The findings of the study	94
5.2.1. Findings based on interview	94
5.2.1.1. The challenges facing Physical Science Grade 12 educators in rural schools	
5.2.1.2. The factors affecting the performance of Grade 12 Physical Science learners in rural areas	95
5.2.1.3. The strategies used by Physical Science educators in improving Physical Science Grade 12 results	96
5.2.2. Findings based on observations	97
5.2.2.1. Classroom teaching practices	97
5.3. Delimitations of the study	98
5.4. Contribution to knowledge	98
5.5. Recommendations	98
5.5.1. Recommendations related to the study	98
5.5.2. Recommendations for further studies	99
5.6. Overview of the study	100
5.7. Conclusions	101
REFERENCelist	102

ACRONYMS

BDE	Department of Basic Education
CAPS	Curriculum Assessment Policy Statement
HOD	Head of Department
SMT	School Management Team
NCS	National Curriculum Statement
MSL	Mobile Science Laboratory
LTSM	Learning and Teaching Support Material
SASA	South African School Act
PSOPP	Public Schools on Private Property
FET	Further Education and Training
QP	Qualified for Progression

LIST OF APPENDICES

APPENDIX A	Interview schedule	117
APPENDIX B	Observation sheet	118
APPENDIX C	Letter to the Department of Education	120
APPENDIX D	Participant informed consent declaration	122
APPENDIX E	Response letter from the Department of Education	125
APPENDIX F	Ethical clearance certificate	126
APPENDIX G	Editing certificate	127

CHAPTER ONE

INTRODUCTION AND BACKGROUND OF THE STUDY

1.1 INTRODUCTION

The Department of Basic Education (DBE)'s Physical Science section faces a challenge of producing more Physical Science learners who pass Grade 12 with flying colours. If more Physical Science learners pass Grade 12 well, our country, with a shortage of skilled manpower in fields such as engineering and medicine (National Development Plan, 2011), could be uplifted. More learners are required to study Physical Science in order to enrol for such professions at institutions of higher learning, but a poor performance at Grade 12 is of great concern. As such, strategies to improve learners' performances at this level are thus crucial.

The majority of South African learners attend school in rural areas where poor performance in Physical Science is rife. Gardiner (2008) indicated that South Africa inherited apartheid's education system, which was divided on racial grounds and, was funded and resourced in ways that favoured white people and disadvantaged blacks. Even though the government tries to improve teaching and learning conditions in rural areas, there are schools that continue to underperform. The DBE's Circular No. 13 of 2014 states that schools have the responsibility to triple output of learners who pass mathematics and Physical Science in Grade 12 by 2024.

The target seems high, but it could be realised if all stakeholders play their part. The Minister of Basic Education indicated (National Senior Certificate-Examination Report, 2016) that the results from the recent international studies (Trends in International Mathematics and Science Study and the Southern and East African Consortium for Monitoring Educational Quality) show that performance of Southern African learners is on an upward trajectory. This should, however, not make us relax. Instead, we should put more effort as we apply strategies to improve performance, particularly in rural schools where it is still low.

Educators play an important role in helping learners perform well. Ngema (2011) posits that teachers still use traditional approaches to teaching and learning. Quality

education provision is, partly, influenced by teaching approaches adopted by educators at any given time. In this view, educators should apply teaching methods suitable for the type of learners they teach, in addition to the availability of relevant resources. In addition, lessons should be prepared according to the environment within which the school is situated. Another consideration should be that of the right attitude coupled with the educator's content knowledge level. In this way, Physical Science results are likely to improve. Sheldrake, Mujtaba and Reis (2017) indicated that teaching applications of science as the only measured teaching approach to consistently and positively associate with learners' interest and perceived utility of science. This approach is thought to make science relevant to learners' lives. Relating Physical Science to everyday activities could make science more enjoyable to study, and this could improve the learners' performances.

Kriek and Grayson (2009) noted that poor performance in Physical Science is due to limited content knowledge, ineffective teaching approaches and educators' unprofessional attitudes. Even though there are schools that do not do well in rural areas, there are some that perform very well under the same environment. Educators' commitment in teaching could help improve learners' performance. As indicated by the DBE in Curriculum Strategy to Improve Education in the Limpopo Province (2011), the quality of any education system is as good as its educators' level of competence. Educators' knowledge of the subject matter also play an important role in improving the learners' performance.

It is the responsibility of the schools to provide the required support to educators for them to improve the performance of our learners. School leaders know the situation confronting their educators daily. They must assist Physical Science educators in dealing with challenges that lead to learners' poor performance. Hlabane (2016) acknowledged that learners' difficulties are related to proficiency in language of instruction, conceptual understanding, questions that require explanation and higher order thinking skills, difficulties in comprehension and analysis of questions and mathematical skills. For good results in Physical Science, it is the responsibility of the school and its educators to address such problems for quality result attainment. Language problems are a hindrance to any child's progress. Learners cannot attain excellent results if they do not understand what they are taught and examined.

Semeon (2014) revealed that learners face difficulties with meanings of everyday words when used in science context. Science educators lack strategies to help solve the problems they encounter daily in class. Learners can do better if science teachers have proper strategies to deal with classroom problems. Poor understanding of what is taught could lead to learners' poor performance. Physical Science terminology is difficult to most rural school learners due to lack of sufficient lab equipment. That is, if rural schools had well equipped laboratories, learners would easily understand science language through practice.

A study by Ramnarain and Fortus (2013) on teachers' perceptions of new content in a revised curriculum indicated that teachers are uncertain as to their content knowledge and pedagogical knowledge of the new topics. Performance of learners in Physical Science at Grade 12 level could also be affected by educators' lack of knowledge on certain topics. Teachers need in-service training on newly introduced topics if they are to teach them effectively. It is difficult for learners to understand concepts that are equally difficult for teachers to comprehend. That is, teachers are supposed to be masters of content for which they transfer to learners. To produce many learners with excellent passes in Physical Science subjects, teachers, the management and the DBE should work together in order to eradicate challenges that lead to learners' poor performance.

Redding and Walberg (2012) concur by stating that by creating learning situations in which students experience success, positive motivation builds up domain- specific positive beliefs as students' knowledge and skills develop. The learners' performances in Physical Science at Grade 12 level in rural areas could also improve if the said challenges are tackled head-on. This would mean that learners would likely experience a conducive learning environment that would lead to their motivation to learn. Scholars on children's learning have done a lot on motivation. The next section deals with what they say about the teaching of Physical Science.

Limpopo is one of the provinces that do not perform well in Physical Science subjects at Grade 12. This may be that it is largely rural; hence lack appropriately equipped laboratories that are key to the effective teaching and learning of these. Nevertheless, though, Physical Science educators in rural areas have a mammoth

task of improving Grade 12 results. To help achieve this, educators' teaching methods should also be improved to enhance their learners' level of understanding of the said subjects. Legari (2004) pointed out that educators go an extra mile to cope with the conditions of teaching they are faced with. In addition, he illustrated that if educators are not creative enough, they could lose their passion in teaching. To produce excellent results in rural areas, educators should be dedicated to their teaching profession. One could argue that a willing heart produces better results in areas where there is no passion for education. That is, educators are better placed to make learners change their negative attitude towards learning, hence desire education under difficult conditions.

Rammala (2009) observed that school factors contribute to poor performance among Grade 12 learners due to lack of facilities, unavailable learner support materials, lack of discipline, English, as a medium of instruction and heavy workload, due to rationalisation and redeployment of educators. This indicates many contributing factors that affect learners' performances. In order to improve Physical Science' performance at Grade 12 level, schools should have facilities suitable for teaching such subjects, for example, laboratories where practicals are performed. Dhurumraj (2013) espouses that with the introduction of CAPS syllabus in Grade 12 (in 2014), practicals in Physical Science across all schools were standardised despite rural schools' lack of resources. The availability of laboratories in schools could lead to improved results in Physical Science. Through performing practicals, learners could easily recall what they learned. Under the CAPS syllabi, practical knowledge is examined, and this could be difficult for learners who are not properly taught.

Legotlo, Maaga and Sebego (2002) noted the lack of resources as the major contributory factor to poor performance at Grade 12 level. The study also discovered that some schools were without furniture, chalkboards, doors and windows. Obviously, the lack of these negatively affects the learners' performance (Ngema, 2016). To help improve the situation, educators should be provided with adequate resources to enhance their teaching. Teaching and learning materials are the basic aspects for the effective teaching of a child. Their lack thereof hinders the improvement of our education system.

Research by Wits School of Governance and Bridge (2016) revealed that most school communities do not work together. This makes it difficult for Physical Science educators to improve learners' performances in Physical Science subjects. There is a need, therefore, to share challenges they face to ease the burden on them. Phalane (2011) explained that the absence of teamwork seems to impact negatively on a significant number of activities in the school, which results in poor performance by that school's learners. Teamwork is very important as it enables educators to assist one another with their schoolwork. Burke, Grosvenor and Norlin (2014) remarked that ordinary daily team meetings contribute to teachers dealing with important and necessary issues in their teaching that include, *inter alia*, specific pupils and, social and disciplinary problems in the classroom. Providing collaborative observations, Sparks (2013) concluded that schools rise and fall based on the quality of the teamwork that occurs within their walls. That is, a school can only produce good quality results if teachers are able to work as a team. In taking cognisance of the value of teamwork, we should not lose sight of the fact that approaches in teaching differ as they depend on teachers' knowledge.

Physical Science educators also face problems associated with the lack of support from Physical Science' Heads of Department. Rajoo (2012) stated that if the HOD sees his/her leadership role as primarily one of instructional leadership, educators will be given the necessary guidance and support to effectively teach the curriculum and learners will perform well as a result. Some schools do not perform well in Physical Science at Grade 12 level because educators do not get assistance from their seniors. The DBE (2016) reasoned that the HOD's job is to teach, responsible for effective functioning of the department and organise relevant/related extra mural activities to ensure that the subjects, learning area or phase and the learners' education are properly promoted. They assist with planning of school activities and the organisation of text books and equipment for the department.

If there is no co-operation or support between the educators and their HOD, improving results could prove difficult. To enhance teaching and learning of Physical Science subjects, teachers should report their needs to the HOD. It is the responsibility of the HOD to ensure that resources that could help learners improve their performances are readily available in the department. The HOD, together with

his/her team should develop policies that help improve learners' performances and enhance educators' commitment in improving the results. HOD's are in a management position, hence their responsibility to ensure that educators are assisted in producing good results. That is, educators report all challenges they encounter in their teaching direct to them.

Physical Science educators in rural schools lack support from the School Management Teams (SMT). The Kwazulu-Natal's Department of Education pointed out that SMTs seem to lack strategies to implement the curriculum policy at classroom level, as well as translating the importance of effective teaching and learning. Grade 12 results in Physical Science could improve if the SMTs support educators where they need assistance. According to Legotlo et al. (2002), some schools have no effective supervision, and communication is very poor at various levels, and they lack support staff. Lack of support by SMTs leads to the decline in learners' performances. It is important to keep on checking what educators do in class to ensure that they follow the departmental policies. Regular communication could also boost educators' morale. It becomes easy for motivated educators to help each other, and that could also improve Physical Science results.

The Physical Science section of the Department of Education in the Vhembe District is serviced by only 3 Physical Science subject advisors. It is difficult for them to offer support to all schools in the district. According to the DBE policy, a subject advisor is a specialist office based in a district or circuit office whose functions are to facilitate curriculum implementation. In addition, to improve the environment and the process of teaching and learning by visiting schools and consulting with and advising school principals and teachers on curriculum matters. If Physical Science subject advisors give the necessary support to schools as stipulated in the policy, Physical Science performances at Grade 12 level would likely improve. The policy outlines clearly the duties of the subject advisors that could lead to the betterment of the Grade 12 results. They could also assist in teaching learners where teachers struggle.

1.2. PROBLEM STATEMENT

The national performance of Physical Science learners in Grade 12 is not satisfying. The pass percentage is very low and as a country, we are still lacking people with

skills related to science. Provinces that supposedly contribute to a high percentage of learners' failure in Physical Science subjects are said to be Eastern Cape, Limpopo and Kwazulu-Natal. Most schools that do not perform well are in rural areas. Mulkeen (2005) noted that children in rural settings are regarded as difficult to teach due to limited parental assistance at home. In this context, Physical Science educators in rural schools should develop strategies that help deal with challenges they encounter in order to improve their learners' performances. Some schools in rural areas also lose learners to those in urban areas.

Drastic steps should be taken to ensure that learners improve their performance at school. The research on practices and challenges facing Physical Science educators in Vuwani's rural schools has not been done yet. There is not much written about this phenomenon in Vuwani. While available literature focus more on challenges teachers experience in the teaching of these subjects, not much research has been on the teaching techniques, classroom settings, and interactive behavioural tendencies between educators and learners, and among learners themselves

1.3. AIM OF THE STUDY

The aim of the study is to explore practices and challenges that face Physical Science educators in their bid to improve Grade 12 results in Vuwani rural schools, Vhembe District.

1.4. OBJECTIVES

The following objectives guided this study.

1. To investigate factors that affect Physical Science learners' performances at Grade 12 level in Vuwani's rural schools.
2. To identify challenges faced by Grade 12 Physical Science educators in Vuwani's rural schools.
3. To identify strategies used by educators to improve Grade 12's Physical Science results.
4. To investigate the effects of teaching practices in the context of classroom setting and interaction (and behaviour tendencies) between the educator and

his/her learners, and amongst learners themselves, on Grade 12 learners' Physical Science performance.

1.5. RESEARCH QUESTIONS

This study is guided by the following research questions:

1. What are the factors that affect Grade 12 learners' performance in Physical Science in Vuwani's rural schools?
2. What are the challenges faced by Grade 12 Physical Science educators in Vuwani's rural schools?
3. What strategies do Physical Science educators use to improve results at Grade 12 level?
4. How do teaching practices in the context of classroom setting and interaction (and behaviour tendencies) between the educator and his/her learners, and amongst learners themselves, affect Grade 12 learners' Physical Science performance?

1.6. CLARIFICATION OF KEY CONCEPTS

1.6.1. Educator practices

A study by Goe (2006) stated that educator practices are instructional strategies and classroom behaviours that educators exhibit as they interact with learners in educational settings. Li and Oliveira (2015) indicated that educator practices are processes that involve multiple agents and their interactions within the classroom system. Gudyanga (2017) defined educator practices as the way, in which educators conduct their lesson planning, presentation and assess learners,

For the purpose of this study, educator practices are the approaches used by educators to teach Grade 12 Physical Science learners.

1.6.2. Rural schools

The Department of Basic Education (2017) regarded rural schools as schools in farms and traditional areas characterised by low population densities, low levels of economic activity and low levels of infrastructure. Myende (2014) defined rural schools as any school found in a place led by traditional leadership.

In this study, rural schools refer to schools in traditional areas, which mostly lack resources and infrastructure.

1.6.3. Improve results

A study by Dunlosky, Rawson, Marsh, Nathan and Willingham (2013) indicated that improving results involves helping learners to regulate their learning through use of effective learning techniques. Ballard and Willey (2015) stated that improving results relates to measuring of output of a particular process and then modify it in order to increase efficiency or increase the effectiveness

For the purpose of this study, improving results refer to increasing number of learners passing Grade 12 Physical Science.

1.6.4. Educator Challenges

Learning about science requires the coordination of a complex set of cognitive, affective, and motivational strategies and skills (Anderman & Sinatra, 2009). Basson and Kriek (2012) noted that educators encountered problems like training, support, resources and lack of content knowledge due to curriculum changes.

For the purpose of this study, challenges refer to problems that hinder educators from teaching Physical Science in grade 12 effectively.

1.6.5. Physical Science Educator

Geelan (2020) stated that a physical science educator must have the ability to construct, adapt to student needs and interests, deliver, receive feedback on, adapt, and re-deliver science teaching explanations. Anderman et al. (2009) described a science educator as someone who can create social contexts that foster the emergence and development of adaptability, complex communication/social skills, non-routine problem-solving skills, self-management/self-development, and systems thinking ability.

In this study, a physical science educator refers to anyone who teaches physical science in grade 12.

1.7. SIGNIFICANCE OF THE STUDY

When this study is done, the participants would be informed of its findings. This would encourage them to follow the practices that could lead to the improvement of

the learners' performance in Physical Science at Grade 12 level. Through permission from the DBE, I would help provide guidance to schools that offer Physical Science in Vuwani to improve results. In addition, workshops to disseminate and share this study's results would be conducted in Vuwani's rural schools. Learners would also be addressed on issues that affect their learning (Physical Science subjects) for them to improve their performances.

The research might help the DBE in that the findings could be used to help improve rural schools' educators' teaching methods to produce better results in Physical Science subjects. The department could help solve challenges encountered by educators in rural schools, and this might lead to improved results in future. The study could help educators formulate relevant strategies for use in improving Physical Science results.

1.8 RESEARCH DESIGN AND METHODOLOGY

The research design and methodology show details of how the research was conducted. The description of the population that took part, the data collection procedure, sampling procedure and data analysis were explained in detail.

1.8.1 RESEARCH DESIGN

Bhattacharjee (2012) defined a research design as a comprehensive plan for data collection in an empirical research project. This study adopted an ethnographic research design. Maree (2015) indicated that the aim of ethnography is to describe a culture or way of life from the perspective of a people by making sense of the inherent meaning of gestures, displays, sayings and everything else that has some implicit or tacit meanings in the culture. This design helped determine the educators' practices and challenges they encounter at school through an ethnographic research design. It helped understand their ways of teaching.

1.8.2 RESEARCH METHODOLOGY

Kothari (2004) defined methodology as a way of systematically solving a research problem. In this study, the methodology included population, sampling and data collection procedures, and data analysis. The following were addressed to solve the study problem.

1.8.2.1 POPULATION

Welma, Kruger and Mitchel (2005) indicated that population is the study of objects, and it consist of individuals, groups, organisations, human products and events, or conditions to which they are exposed. Only schools offering Physical Science in Grade 12 were considered in the study. The population of the study comprised 49 Physical Science educators from the Vuwani Cluster. Vuwani is a rural area located in the Vhembe District, Limpopo Province.

1.8.2.2 SAMPLING PROCEDURE

A study by Mugo (2002) defined sampling as an act, process, or technique of selecting a suitable sample, or a representative part for the purpose of determining parameters or characteristics of the whole population. To conduct a research using the whole population could be very expensive. The part sampled represents the views of the whole population and it minimises the cost of conducting a research. The researcher used the purposive sampling procedure to select schools, which offer Physical Science subjects at Grade 12 level. Maree (2015) asserts that purposive sampling refers to selecting participants according to pre-selected criteria relevant to a particular research question. The criteria used was to choose Grade 12 Physical Science educators since they were units of analysis there. According to Ali (2014), purposive sampling allows for the selection of appropriate persons for inclusion in the study. All public schools in Vuwani that offer Physical Science at Grade 12 level were considered for sampling. In order to sample ten schools, names of 49 such schools were put in a container. The first ten picked made up the sample.

1.8.2.3 DATA COLLECTION PROCEDURE

A semi-structured interview schedule was used to conduct face-to-face interviews with the sampled Grade 12 Physical Science educators. The first part of the schedule was designed to obtain demographic information of the educators. The interviews collected data on opinions and views of educators regarding factors affecting learners' performance, challenges faced by Physical Science educators and strategies used by educators to improve Physical Science results. Participants were requested to share their knowledge on how they teach Physical Science subjects and how their learners perform. An interview was only recorded once permission to do so was granted.

Field notes and observations were done during interviews. Maree (2015) defined observation as a systematic process of recording behavioural patterns of participants, objects and occurrences without necessarily questioning or communicating with them. In this case, the researcher went into classrooms and observed what was happening therein. The researcher observed educators teaching, focusing on their teaching strategies. Taking notes provided a clear picture of what was done during those lessons. The researcher observed their teaching techniques, classroom set up and interaction tendencies (between educator and learners, and among learners themselves).

1.8.2.4 DATA ANALYSIS

Data was analysed after its collection was done. Flick (2013) explains qualitative data analysis as the classification and interpretation of linguistic (or visual) material to make statements about implicit and explicit dimensions and structures of meaning-making in the material and what is represented in it. The researcher engaged with the data collected to find meaning, sequence and connections with what was observed. Data obtained through interviews was analysed *verbatim*. Coding was used to organise and analyse such data. Maree (2015) sees coding as a process of reading carefully through transcribed data, and dividing it into meaningful analytical units. Data was thematically analysed for purposes of interpretation.

1.9. ETHICAL CONSIDERATIONS

Research ethics, procedures and policies of doing research at this university were observed. Kamat (2006) asserts that the researcher has an obligation to honour the trust that his/her colleagues place on him/her. Before interviews, the researcher assured participants that the interviews would be confidential, and their names would not be revealed. Orb, Eisenhauer and Wynaden (2001) noted that the research process creates tension between the research's aims and the participants' rights to privacy. Here, participants voluntarily participated and hence their rights were not violated. Permission to conduct interviews was requested from and granted by the Vhembe District's Department of Education. Thereafter, appointments with prospective informants were made.

1.10. RESOURCES

To conduct this study effectively, resources such as stationery, printer, ink, transport and editing funds, and data bundles were needed. It was my responsibility to ensure that these were sourced beforehand so as not to jeopardise this study.

1.11. INTERLECTUAL PROPERTY AND INNOVATION

Information gathered reflects creativity and understanding of the phenomenon under study. Rodgers (1998) ascertained that innovation is the process of introducing new ideas to the firm, resulting in increased firm performance. A study, therefore, should not be a duplication of the already existing knowledge, but should bring in new ideas.

1.12. HARVESTING THE RESEARCH

After completing this study, a paper was sent to the International Journal of Educational Research for publication. In addition, the following papers will be presented at conferences:

- Factors affecting the performance of Grade 12 Physical Science learners in Vuwani's rural schools.
- Challenges encountered by Grade 12 Physical Science educators at Vuwani schools.
- Teaching practices at Grade 12's Physical Science Subjects in Vuwani.

1.13. CHAPTER OUTLINE

Chapter One is an introductory Chapter that explains the manner in which the study is laid out. Outlined here are the study's aim, its hypothesis, problem statement, work schedule, the preliminary literature review and the methodology used.

The next chapter provides a detailed literature review. Here, the focus is on what other scholars say about the phenomenon under study. Their views and observations helped situate this study in the context of what has been studied so far.

In Chapter Three, the study focused on methodology and its inherent research design. Outlined here are the study's population, sampling and sample size, data collection techniques and ethical considerations.

The fourth Chapter analyses data collected during field work. Data was analysed through coding for easy understanding when being interpreted in the following Chapter.

The last Chapter discusses the study findings. This is done thematically. Also provided in this Chapter are the study's recommendations. These are based on the study's findings. Last, a conclusion is drawn to close the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

The previous Chapter introduced this study. The current chapter provides the study's theoretical framework where Constructivism Theory and the Theory of Behaviourism are discussed. Additionally, included is the DBE's policy on schools in rural areas schools.

Education should be provided such that it ensures learners realise their full potential and what they aspire to be in life and then reduce societal disparities (Ncanywa, 2015). Limpopo is one of the provinces that do not perform well at Grade 12 level in Physical Science. Physical Science educators in rural areas are faced with a mammoth task of improving Grade 12 results, but there are a lot of challenges they should overcome. It is, therefore, necessary to improve the quality of education that is provided to the poor (Bayat et al., 2014).

If the quality of education provided in rural areas is improved, the country can easily develop. Legari (2004) indicated that educators go an extra mile to cope with the conditions of teaching. It can be very difficult for educators to produce quality results if they are not accustomed to conditions in rural schools. Teaching in rural schools needs committed and hardworking educators to produce good results. If educators are not creative enough, they could lose their passion for teaching. Educators in rural areas should be positive about their work in spite of challenges they may face.

Edomwonyi-Out and Aava (2011) pointed out that the chemistry teacher, students, parents, senior secondary school administrators, curriculum planners and government face daunting challenges in re-awaking interest and providing an enabling environment for effective teaching of sciences. Learners should be motivated to do science subjects, even though most of them believe that these are difficult. A creative educator should use strategies that could make learners enjoy the subject matter under difficult conditions. Durlak, Weissberg, Schellinger, Dymnicki and Taylor (2011) stated that students do not learn alone, but rather in collaboration

with their educators, in company of their peers and with the encouragement of their families.

2.2. QUALITY EDUCATION

Quality education is education that can best fit the needs of learners and community (Fredriksson, 2004). Improvement of the standard of teaching and learning in schools can make learners choose careers related to their abilities and needs. Shortage of skills related to Physical Science can be solved by offering quality education. Thangeda, Baratiseng and Mompati (2016) indicated that quality education inspires creativity and can improve the nation's economy. Improvement in Grade 12 Physical Science results can help reduce shortages in engineering, doctors and artisanship.

Quality education is considered as a cornerstone of economic development and social transformation (Bayat, Louw & Rena, 2014). For a country to develop there is a need to offer quality education. Science education is particularly important for both developed and developing countries to promote technological development, and global economic growth (Schulze & Lemmer, 2017). In South Africa, the study of science subjects should be promoted as the country lacks technological skills needed for develop. Most rural areas are underdeveloped; consequently, there is no proper schooling for children.

Physical Science educators play an important role in learner achievements. They know the challenges they have to face each time they go to class as they are the implementers of the strategies that seek to improve the teaching and learning conditions in class. The DBE illustrated (Curriculum Strategy to improve education in Limpopo Province, 2011) that the quality of an education system is as good as its educators' level of competence. Ngema (2016) agreed, adding that educators' lack of specialised content knowledge is a contributing factor to learners' poor performance in Physical Science. When an educator teaches, knowledge is transferred to learners. A Physical Science educator who is not knowledgeable cannot teach quality lessons in class. Thus, the quality of education that Physical Science learners acquire determines their performance in the end.

Stakeholder collaboration would help reduce challenges that are experienced by rural schools, thus lead to result improvement. Stakeholders should keep an eye on how schools operate, including the quality of results produced. Makewa and Ngussa (2015) noted that achieving better learning outcomes fundamentally depends on improving the teaching of subjects at school. It is the school management's responsibility to ensure effective teaching by providing a conducive environment and good leadership. In addition, provision of necessary resources and addressing problems encountered by Physical Science educators could lead to improved results in rural schools.

2.3. LEGISLATION: ANALYSIS OF THE SOUTH AFRICAN POLICY ON RURAL EDUCATION

In terms of section 29 of the Constitution of the Republic of South Africa (1996), all children have a right to basic education, irrespective of their geographical location. All learners have the right to be supplied with all educational materials needed for them to prosper academically. It is the responsibility of the government to ensure that schools are adequately resourced to aid proper learning. The South African Schools Act (SASA) of 1996 embodies a uniform system for the organisation, governance and funding of schools. It also guides either amending or repealing of certain laws related to the functioning of schools. The act assists the government in providing quality education in the country. All children should be treated equally, regardless of where they reside.

The 2005 Ministerial Committee Report on Rural Education alludes to the poor quality of education in public schools on private property (PSOPP). In particular, schools in farms and rural areas are observed keenly here. The quality of education is compromised by the protracted process in concluding Section 14 (Agreements), as provided for in SASA. Furthermore, the Ministerial Committee's findings endorse the idea of effective and creative implementation of Section 14 to enhance the delivery of quality public education. The committee was formed because of slow-paced development in rural schools. That is, rural schools lack, *inter alia*, infrastructure, resources and sanitation. The school environment should be conducive to teaching and learning if learners in rural schools are to perform well at

Grade 12. To facilitate the speedy improvement of quality education in rural areas, the government appointed a provincial rural education coordinator whose responsibilities are, among others:

- Establishing a provincial database of all public schools on private property (farms) and in rural areas. The database should include, *interalia*, the demographic, topographic, as well as, legal ownership of the property; and
- Monitoring and supporting districts in the process of concluding SASA's Section 14 (Agreements) to ensure legal compliance.

2.4. CHALLENGES ENCOUNTERED BY PHYSICAL SCIENCE EDUCATORS IN RURAL SCHOOLS

Banerjee (2016) listed lack of positive environment and support as two factors that link deprivation with under-achievement. Educators cannot fully commit themselves in school activities if they are not properly guided. The Limpopo Basic Education Department stated that schools under good managers with proper management skills manage curriculum well, and this leads to improved learner achievement. Learners' poor performance in schools might also be caused by lack of knowledge or vision by the SMT. SMTs should be capacitated to improve the learners' performances, and this could lead to improved Physical Science pass rates. If SMTs could account because of the performance of learners at their schools, there could be an improvement in all subjects. Learners' performance in Physical Science subjects could be influenced by challenges that educators experience. Challenges such as educators' workloads, curriculum support and change are discussed below in detail.

2.4.1 Educators 'workload

Besides the main responsibility of teaching, educators are assigned to do different tasks at school. Ingersoll (2002) noted that deficits in the quantity of teachers produced and in the quality of preparation prospective teachers receive have long been singled out as primary explanations for under qualified teaching. If a school has a shortage of educators, those at work are forced to cover more periods in addition

to administrative duties. It is not easy for an educator to produce quality results when overloaded. They become ineffective in their duties as they do not have enough time to refresh. According to Zenda (2016), high workload is one of the factors that lead to high failure rate. DBE should come up with necessary solutions if schools are to operate effectively. That is, certain small schools have different streams, and this result to educators having to cover several periods on end. The DBE should assist such schools in reducing their multiple streams.

2.4.2 Curriculum support

Physical Science educators also face problems of lack of support from Physical Science Heads of Department (HOD) or the School Management Team (SMT). Rajoo (2012) stated that if the HOD sees his/her leadership role as primarily one of instructional leadership, educators will be given the necessary guidance and support to effectively teach the curriculum learners will perform well. Some schools do not perform well at Grade 12 in Physical Science because educators are not assisted by their seniors.

According to the DBE (Government Gazette, 2016), the HODs assist with the planning of school activities, organising of textbooks and equipment for the department. If there is non-co-operation or support between the Physical Science educator and the HOD, it could be difficult to improve results. Adhering to protocol, the Physical Science teacher submits all required resources/materials (for the smooth teaching of the subjects) to the HOD. It is the responsibility of the latter to make sure that such resources are available in the department. The HOD, together with his/her team, should develop policies that help improve the learners' performance and the educators' commitment to improve the results. It is the responsibility of the HOD to make sure that educators under his/her department are fully helped to produce good results.

Physical Science educators in rural schools lack support from the SMT. The Kwazulu-Natal's Department of Education indicated that the SMTs seem to lack strategies to implement the curriculum policy at classroom level. The Grade 12 results in Physical Science could improve if the SMTs support educators where they need assistance. Legotlo et al. (2002) indicated that at some schools, there is no

effective supervision, communication is very poor at various levels and there is no support staff. Lack of support by SMTs leads to the decline of the learners' performance. Educators cannot fully commit themselves in school activities if they are not properly guided.

According to the Limpopo's DBE, schools with good managers and good management skills manage their curricula well, and this leads to improved results. Learners' poor performance at school might be caused by the SMT's lack of knowledge or vision. Educators, HODs and SMTs should be capacitated in order to improve the learners' performances in Physical Science subjects. Subject advisors should also assist schools that under perform. According to the DBE Policy (2012), a subject advisor is a specialist officer located in either the district or circuit offices, whose function is to facilitate curriculum implementation to improve the environment and process of teaching and learning. He/she does so by visiting schools, consulting with and advising school principals and teachers on curriculum matters. If Physical Science subject advisors give the necessary support to schools, as stipulated in the policy, performance in Physical Science at Grade 12 levels would improve. The policy clearly outlines duties of the subject advisors that could lead to the betterment of Grade 12 results. They could also assist in teaching learners where teachers struggle.

2.4.3. Curriculum change

Teachers can play a role towards the success or failure of the curriculum implementation (Makewa & Ngussa, 2015). Educators should be well taught on what they need to consider if the curriculum changes. They should know the changes they should introduced to the new systems. Despite the changes effected in the curriculum from the NCS to CAPS, educators have however not changed their teaching approaches (Gudyanga, 2017). Dhurumraj (2013) acknowledged that with the introduction of CAPS syllabus in Grade 12 (in 2014), practicals in Physical Science across all schools were standardised, but schools were not resourced accordingly.

Practical assessment is part of examinations and it, thus, becomes difficult for learners to respond properly to questions that call for such skills. To compound the

learners' woes here, most schools in rural areas have no fully equipped laboratories. Educators should be re-trained on how to implement the new curriculum in order to impart correct knowledge and skills to learners. Kibirige, Rebecca and Mavhunga (2014) noted that practical work improves learners' performance. Hassan (2015) acknowledged the lack of major facilities such as laboratories and books as factors that cause poor performance in Zanzibar's schools.

2.4.4. Resources

Resources are materials that educators use to achieve meaningful teaching and learning. They promote progress in learning. Legotlo et al. (2002) rated lack of resources as the major cause of poor performance in Grade 12. They noted that some schools were without resources such as chairs, chalkboards, doors or windows. If educators teach without enough resources, learners are doomed to fail. Educators need enough resources in order to improve Grade 12 results and produce competent learners. Teaching and learning materials form the basis for teaching a child. The availability of resources at school could make learners comfortable, thus enhance their focus in their learning.

Mandina (2012) established that Zimbabwean rural areas are characterised by various challenges that negatively influence delivery of quality education such as poor socio- economic background, lack of basic infrastructure for teaching and learning, the problem of attracting and keeping qualified teachers in rural schools, poor funding and limited resources. It is important to develop good working conditions and to keep qualified educators in order to improve the quality of education offered at schools. Lack of resources and unqualified educators compromise the quality of education. Educators who are qualified cannot resist the offers from other sectors if the working conditions at schools are not conducive, thus learners are deprived of quality education. Furthermore, the low status accorded to the teaching profession, teachers' poor salaries, inadequate accommodation, limited career and professional development opportunities as well as poor working conditions were cited as obstacles to quality and effective teaching (source). It is important to improve the working conditions at schools so that results may improve. If the results improve, more learners would further their studies at tertiary institutions throughout the country.

A study by Lyimo, Too and Kipng'etich (2017) revealed that similar challenges were experienced in Tanzania where there was an inadequate number of textbooks, reference books, maps and globes in schools due to an increase of students in Community Schools. The study further indicated that schools have inadequate physical facilities such as classrooms, desks, chairs and the available classrooms are poorly constructed with inadequate spacing. Schools without adequate teaching resources cannot produce desired results. Only committed educators who can go an extra mile by being creative and improvise could make lessons productive. Many learners could be left behind if lessons are not enjoyable.

2.4.5. Classroom environment

Maemeko, Nkengbeza and Ntabi (2017) indicated that poor learning environment is a factor that contributes to learners' low performance. Some learners have to battle with the conditions under which they are before understanding what they have to learn. The poor learning environment could reduce learners' focus in class. Sayani (2015) indicated that it is the responsibility of the educator to assist learners gain knowledge, skills and critical thinking by implementing various innovative strategies, but under positive and conducive environment. It is the role of the DBE to provide proper environment for all educators and learners. Educators must make sure learners are taught accordingly under positive environment.

2.4.6. Overcrowding

Overcrowding in classes is caused by lack of classrooms (Matshipi, Mulaudzi & Mashau, 2017). In rural areas, infrastructure shortage is still a serious challenge, which needs an urgent attention. It is difficult to deal with overcrowded classes. An educator cannot easily assist learners in overcrowded classes. It can be very difficult to help learners individually. Individual attention improves learners' performance. It can also hamper the proper assessment of lesson presented. A lesson that is not properly assessed does not help achieve set objectives. Skills and knowledge that should be attained during lesson presentation should be assessed.

In order to improve learners' performance, the government should help build proper structures. A study by Shah (2012) indicated that small classes are easy to handle.

With small classes, educators could easily interact with learners and learners to improve their performance.

2.5. FACTORS AFFECTING THE LEARNERS' PERFORMANCE IN PHYSICAL SCIENCE SUBJECTS

Learners' performance in Physical Science at Grade 12 level could be affected by both home and school environments. Parents' encouragement and their assistance at home could help improve the child's scholastic achievement. Educators' support could also motivate the child to focus on studying.

2.5.1. Home environment

A study by Obeta (2014) defined a home as a place of residence or refuge where one lives permanently, especially as a member of a family or household. The environment that a learner comes from plays a role in his/her performance at school. A good quality home environment as well as positive attitudes from the parents has significant correlation with high achievements (Noah, Benson & Samuel, 2015). If the environment is conducive and parents are supportive, the child could easily direct his/her efforts to scholarly activities, and learners could perform well if educators and parents work together.

A study by Rammala (2009) noted that some learners' home environments are not educationally supportive due to poverty, and this includes high unemployment rate, child-headed families and parents' low level of education. Grade 12 performance could improve if learners' parents are involved in helping them. The conditions stated make it difficult for some learners to concentrate on their schoolwork. For educators to improve results, learners should be assisted in their homework at home. Cruz (2016) indicated that parental involvement in education is one of the key contributing factors to students' academic success. Schools in rural areas face challenges of parents' non-involvement. Lemmer (2018) noted that parents' involvement in South African schools has been primarily limited to school financing and volunteer work. It is important for parents to encourage learners in their studies. It is their responsibility to assist their children in doing homework at home (assignments and projects) and providing support while studying. In other words, parents should systematically

monitor their children's study behaviours and progress in class. Ngema (2016) concurred; pointing out that learners' poor performances at school could be due to parents' lack of involvement in their children's education.

Parents' involvement in their children's education helps cultivate their confidence, interests and performance at school (Muchuchuti, 2014). A supportive home environment help boosts learners' morale. Grade 12 learners' performance could improve if parents are involved in their education. Dhurumraj (2013) acknowledged that most learners come from underprivileged homes and thus receive little support from their parents. Such learners should be consistently monitored at school if they are to improve and progress academically. Schools should design strategies that help close the gap created by such lack of support at home.

2.5.1.1. Socio-economic status

The underperforming schools in the Western Cape Province are mainly located in townships and informal settlements with peculiar contexts, and learners at these schools face a number of socio-economic challenges that limit their ability to achieve (Bayat 2014). The development experienced in the area affects the learners' performance. A study by Kamuti (2015) noted that the parents' economic status influences the learners' academic performance. Motale (2014) noted that the socio-economic conditions, the learners' home environment, the school environment, and the DBE have an impact on one's academic achievement.

A study by Muriungi (2017) noted that families with a lower socio-economic status often struggle with providing academic support to their children and these have low academic expectations and are more likely to exhibit behaviour-related learning problems. A similar study by Bhat, Joshi and Wani (2016) revealed that there is a significant difference in the academic achievement of learners with high socio-economic status and those with low socio-economic status.

2.5.1.2. Parents 'attitude towards education

Parental attitude towards education affects the learners' academic performance (Oundo, Poipoi & Were, 2014). Parents are pillars in their children's education. They might be indirectly involved in teaching and learning, but their support is of great

value. Parental decisions to be involved are generally related to invitations by the school, role construction, and self-efficacy (Henning, 2013). A study by Obeta (2014) revealed that parents, no matter how their busy schedule, should make out time to sit down with their children to check their academic work, direct them where necessary, discuss their children's academic problems with their teachers or school guidance counsellors so as to detect problems early enough and solve them before they affect them. Detecting learners' problems earlier could reduce poor performance. Strategies to assist those who do not perform well could be developed.

Parents should compromise their time for the sake of their children's future. Children whose school needs (physical and emotional) are not provided for at home may forever remain underachievers, and this could affect the general development (physical and human resources) of the country (Kamuti, 2015). Parents must support their children. If more learners are not taken care of, it could be a setback for our developing country. The country is in need of those who could fill the scarce skills jobs.

A study by Mwaura (2014) noted that the parents should balance between the home chores and the learners' academic work, and equally allocate adequate time for both. Parents must assist their children with their studies at home. Dhurumraj, (2013) indicated that most of the learners come from underprivileged homes and receive very little support from their parents. Underprivileged learners face the lack of resources such as food, money, clothes and support from parents or guardians. Learners who are provided with facilities at home perform better than those whose parents do not (Noah, Benson & Samuel, 2015). Parents should give their children support to encourage them to study hard. Learners should be supported both materially and emotionally.

A study by Maluleke (2014) noted that parents do not attend school meetings because of the lack of proper communication. Learners' performance depends on the involvement of all stakeholders. Schools should insist that all parents attend meetings and give support to their children. The study further indicated that parents do not monitor or supervise their children's work while they are at home. It is their

responsibility to make sure that children study at home. Learners must be encouraged and supported at home.

2.5.1.3. Child-headed families

There is an increase of child-headed households in South Africa (Sumbulu, 2014). An increase in child-headed households means that many children should be taken care of by the state. If children without parents are neglected, their future is bleak. Kamuti (2015) noted that many children have been hindered from reaching their optimum level in academic pursuit due to lack of a conducive environment at home. Learners who are not taken care of could easily drop out of school.

A study by Mothapo (2016) noted that most of the learners from child-headed households had no proper uniforms, school shoes, jerseys and bags. It is difficult for learners to perform well when they struggle with financial support from their families. Most of them have low self-esteem. The study further indicated that one of the major challenges that learners from child-headed households experience is being absent from school as they sometimes become too occupied with household chores. They have to organise everything for themselves, and their responsibilities at home reduce their focus at school. The problem affects all learners, including those who do science. Nxumalo (2015) pointed out that children from child headed households' academic experiences are varied. There are those who perform well, while others fail to cope with schoolwork. It is the responsibility of all stakeholders to assist vulnerable learners if they are to realise their goals.

2.5.2. School factors

School factors are those that affect the learners' performance while at school. Factors such as learners' discipline, medium of instruction, resources and the educators' competency are discussed herein. Rammala (2009) noted that school factors that affect Grade 12 learners' performance are facilities, learner support materials, discipline, English as a medium of instruction and heavy workload due to rationalisation and redeployment of educators. The factors above indicate that there are many problems that affect learners' performance.

2.5.2.1. Discipline

The issue of the learners' misbehaviour at school is an international problem. A study by Black (2016) revealed that in the United States of America, public schools suspend millions of learners each year and less than ten percent are of serious nature. The Ministry of Education and Human Resources (2015) advised that for effective learning and teaching to take place, the highest standards of behaviour in all aspects of school life are expected. Educators should teach without fear or being disturbed by learners. Learners must always focus on their studies so that they can successfully achieve their goals.

A study by Ngwokabuenui (2015) on learners' discipline in Cameroon reveals that education prepares learners to live a valuable life within any community, and contribute towards the social, economic; thus, the political development of the nation, appropriate skills, values, attitudes, knowledge and competencies should be imparted to individuals. The importance of discipline in creating an environment conducive to teaching and learning is undisputed (Reyneke, 2013). The number of learners who are suspended each year indicates that educators work in stressful areas.

Banerjee and Lamb (2016) noted that most learners in rural areas are not disciplined due to lack of role models to emulate. Learners who are not disciplined cannot behave and concentrate well in class. They could be disruptive to educators as they teach. If learners are not disciplined, it could be difficult for them to focus on their studies. Results could only improve if learners spend most of their time studying. Learners who are not disciplined have no time to study and have nothing to motivate them. A study by Ngwokabuenui (2015) stated that moral education bodies must reinforce their efforts in ensuring that acceptable moral training is given to children. They should provide a safe, secure and supportive environment where responsible social behaviour is a key priority of the school and discipline is a necessity for the proper functioning of a school (Ministry of Education and Human Resources, 2015). Providing a conducive environment can improve results.

2.5.2.2. Language of teaching and learning

Hlabane (2016) noted that learners' difficulties are related to proficiency in the language of teaching and learning, conceptual understanding, questions that require explanations and higher order thinking skills, difficulties in comprehension and analysis of questions and mathematical skills. For production of good results in Physical Science, it is the responsibility of the school or educators to make sure that such problems are addressed and quality results are attained. Language problems hinder the child's progress. That is, learners cannot attain the required results if they do not understand what they are taught and examined. Semeon (2014) revealed that learners face difficulties with meanings of everyday words when used in the science context. Science educators lack strategies to help solve the problems they encounter every day in class. Learners could achieve better if science teachers have strategies to deal with classroom problems. Poor understanding of what is taught could lead to learners performing below par. Physical Science terminology is difficult to most rural school learners because they only learn theoretically.

2.5.2.3. Educators' competence

Physical Science educators play an important role in learners' achievement. They know the challenges they face in class and implement strategies to improve the learning conditions in class. The DBE (Limpopo Province, 2011) noted that the quality of an education system is as good as its educators' level of competence. A Physical Science educator who is not knowledgeable cannot teach quality lessons in class. The quality of education that Physical Science learners acquire determines their performance. Stephen (2013) noted that incompetent teachers fail to teach all content or complete all assessment tasks as expected.

The Thandulwazi Maths and Science Academy reported in their 2015 Annual Report that the major challenges that face the education system in South Africa are: the capacity to train professional, competent and qualified educators capable of delivering quality teaching in schools across the phases and in all subjects and monitoring the performance and efficacy of teachers in classrooms. In order to improve the Grade 12 learners' performance, educators should have a thorough understanding of the content to be taught. They should assist learners with confidence as they cover the syllabi's content. Many educators who teach Grade 12

Physical Science teach both physics and chemistry, whereas they have majored in one of these (Gudyanga, 2017). Quality results could be achieved if educators teach subjects that are relevant to their qualifications.

Selvaratnam (2011) indicated that successful implementation of the curriculum requires teachers who are competent in cognitive (intellectual) skills and strategies needed for learning science effectively. To improve Physical Science results at Grade 12 level, teachers should know the subject matter and strategies to minimise challenges encountered in class. Pre-service courses for the development of their competence could help improve Grade 12 results, as educators would be aware of what is expected of them. Pre-service courses are also important for those introduced to the teaching environment for the first time. A study by Mokiwa (2013) noted that teachers do not always use English in class. Richard (2002) revealed that educators are assigned by school administrators to teach subjects that have nothing to do with their expertise. Content knowledge is very important in improving learners' performance.

A study by Legari (2004) noted that under-resourced schools perform differently because of educators' experiences. The educators' content knowledge help a lot in the use of different teaching strategies and in identifying alternative resources. They use their knowledge in guiding and motivating learners to improve their performance in Physical Science. The results, according to views and opinions of educators and learners, showed that major causes of high failure rates are poor educators' qualifications, outdated teaching methods, massive workloads, high levels of absenteeism and acute deficiencies in aspects related to: resources, subject content, classroom management skills, proficiency in language of instruction and assessment, motivation and perseverance.

2.5.2.4. Absenteeism

A learner is deemed to be absent from school when he/she is not in class or not participating in a school activity when the register is marked (DoE, 2010). Absenteeism could occur involuntarily due to the learners' social and economic circumstances (Coetzee & Venter, 2016). There are learners who could be out of school due to health problems or others because of laziness. Learners who absent

themselves involuntarily must be assisted on those aspects, which were done in their absence. Learners must be helped to improve their performance if they were absent from school.

Learner absenteeism is one of the causes of poor academic performance (Mboweni, 2014). There is little parental participation in dealing with learner absenteeism because of lack of teacher-parent relationships (Katanga, 2016). Educators and parents should work together to curb absenteeism. If learners know that their parents are strict and cannot allow them to miss school, they would always avail themselves at school. Parents should also visit schools to check their children's performance and behaviour. A good relationship between schools and parents or guardians could assist in improving learners' performance at school.

2.6. CLASSROOM PRACTICE

The quality of education that learners get in class could either improve or lead to poor results. The educators' approach and practice in class are of great importance to learners. Kriek and Grayson (2009) noted that poor performance in Physical Science could be affected by educators' unprofessional attitudes. Educators need to do their work decently. The following aspects are considered to check educators' readiness in class.

2.6.1. Lesson preparation

Lesson preparation shows all activities an educator performs in class. Cicek and Tok (2020) stated that it is a written account of what an educator would like to do during a certain lesson or class period. A good educator prepares all activities before going to class. Learners' performance also depends on the way educators present their lessons. In rural areas where there are limited resources, educators should be strategic in their lesson presentations. The educators' competence on the subject matter plays a vital role in improving the learners' performance.

2.6.2. Teaching approaches

Educators use different approaches in making learners understand what they convey. Using correct teaching approaches improves the learners' knowledge. In Physical Science classroom expository, teaching takes the form of telling facts,

giving information, or telling a story as well as writing on the board or reading a text (Koti, 2016). Sheldrake, Mujtaba and Reis (2017) indicate that teaching the application of science as the only measured teaching approach is consistently and positively associated with the learners' interests and perceived utility of science. The approach is thought to make science relevant to the learners' lives. Relating Physical Science to everyday activities could make science more enjoyable to study, and that could improve the learners' performance. Montrieux, Vanderlinde, Schellens and De Marez (2015) noted that educators shift from educator centred to a learner centred approach. In the learner centred approach, learners participate actively during lessons. Learners who participate actively are likely to perform well.

Kriek et al. (2009) cited ineffective teaching approaches as one of the contributing factors to poor performance in Physical Science. Zenda (2016) also noted the lack of appropriate teaching methods as one of the main issues that lead to high failure rates in Physical Science. Educators need to be trained on appropriate approaches, which could be used to boost Physical Science results in rural areas. Though there are schools that do not do well in rural areas, others perform outstandingly under the same environment. Educators' teaching approaches make a difference in the learners' performance. The same subject matter taught differently to learners in the same environment could yield different results. It is imperative to use approaches that could be suitable to the environment in order to improve results.

2.6.2.1. Modelling instruction

Jackson, Dukerich and Hestenes (2008) revealed that modelling instruction is an effective model for science education because it produces learners who engage intelligently in public discourse and debate about matters of scientific and technical concern. Modelling improves learners' confidence, as learners understand issues better if they are able to relate to them. Cullen (2015) indicated that modelling instruction incorporates components of inquiry with the added benefit of a logical sequence of conceptual development that provides a dynamic learning progression.

2.6.2.2. Practicals

Practical work in Physical Science could promote conceptual understanding (Ngema, 2011). Learners easily understand activities performed or demonstrated to them. The

curriculum and assessment policy statement (CAPS) for Grade 12 indicates three prescribed or formal experiments done per year. The policy is to be adhered to, regardless of the provision of apparatus supplied to all schools. The aim of the DBE is to develop, maintain and support a South African school education system for the 21st century, thus ensuring that all South Africans have access to lifelong learning, as well as education and training. This will, in turn, contribute towards improving the quality of life and building a peaceful, prosperous and democratic South Africa (Thandulwazi Maths and Science Academy, 2015). It is the responsibility of the DBE to provide all schools with adequate resources for them to produce the required quality results.

Erol, Buyuk and Onal (2016) stated that inadequacy of experimental activities (or lack of equipment) in science courses in rural parts of Turkey negatively affects students' acquisition of scientific thinking and inquiry skills. The fact that success rates are notably low in international assessments demonstrates the necessity to adopt "different" approaches apart from the existing learning and teaching methods. From this view, a mobile science laboratory (MSL) was constructed to deliver outreach activities in the rural outskirts of a city in Turkey. The results of the study show that students in rural areas were pleased with the activities. They enjoyed learning science in the MSL, and their interests and curiosity for science contents increased.

The absence of practical examinations from the system of assessment resulted in an undervaluing of inquiry-based practical work in Physical Science classrooms (Tsakeni, 2018). The study also noted that undervaluing of inquiry-based practical work marginalised learners, and the circumstances of limited access translated into a social justice agenda stemming from high expectations associated with studying high school Physical Science. The educators used practical work in their lessons, even though their school context indicated that their laboratories were under-resourced. The study further revealed that demonstration is also used. However, Wilson and Peterson (2006) indicated that learning to enquire in class or out of class is unnerving and time consuming. For the activities to materialise, educators and learners must be well-vested with the knowledge of research and skills. If educators understand the approaches to be implemented, it could also save time. Mbowane,

De Viliers and Braun (2017) indicated that Physical Science expo participation contributes to both pedagogical and content knowledge (as both procedural and declarative or factual knowledge). Educators who involve their learners in science activities improve their skills and knowledge. Commitment by educators and learners is needed to spare some time for science activities.

2.6.3. Assessment

A study by Pellegrino (2016) indicated that assessments must be to support classroom instruction and to monitor science learning on a broader scale. Assessment must be used to measure how learners understood content and also to inform other stakeholders on the progress of learning. It informs the educator on the type of assistance that may be offered to the child to improve his/her competence. Rustaman (2017) noted that there is a closed relationship between science instruction and science assessment. Assessment could be differentiated into 'assessment of learning', 'assessment for learning', and 'assessment as learning', based on the goals. When based on its function, it could be differentiated into formative and summative assessments.

Goal and Stears (2007) claimed that strategies that assess more than learners' written responses to questions are required if we wish to gain a better understanding of the learning that occurs in the science classroom. It has been observed that in high performing schools, there are clearly worked out assessment plans for each Grade that list all the formal assessment plans for each Grade, and the plan is availed to learners and their parents in the first week of the first term (Leepo, 2015). In order to perform well, the school must not work in isolation. There must be cooperation between educators, learners and parents. Expected learners' assessment tasks are known on time for them to get enough time to prepare.

2.6.4. Feedback

Bacilli (2016) indicated that feedback or information about results means acquiring information about an action that has been carried out. It is important to offer feedback to tasks done as it reduces the risk of repeating the same mistakes in future. Orlando (2014) indicated that feedback is an evaluation of past performance that aims at improving performance in future. It is an essential element of improving

the learners' learning processes (Al-Bashir, Kabir & Rahman, 2016). Giving feedback to learners improves performance. Good feedback practices do not only provide useful information to students in improving their learning, they also offer decent information to teachers which eventually improve the learners' learning experiences.

For feedback to be effective in improving learners' performance, it must be done within a short time after they wrote. The educator may notice aspects on which most of the learners did not perform well and remedial action instituted there and then. Brookhart (2008) acknowledged that feedback is a very important component of assessment as it informs the teacher on how learners perform in classroom. He pointed out that feedback should be positive. Positive feedback encourages learners to improve on their performance.

2.7. STRATEGIES USED BY EDUCATORS TO IMPROVE GRADE 12 PHYSICAL SCIENCE RESULTS

Leepo (2015) noted that many intervention strategies implemented at once lack the necessary focus and are not designed to enhance teachers' internal skills and capabilities at underperforming schools. If programmes for improving results are stopped, the results drop because teachers in underperforming schools are not empowered. To improve results in rural schools, educators should be empowered first because they are required to teach their learners daily. Kinyota (2013) noted that there is a need to review and improve subject streaming processes in schools by providing relevant career guidance and advisory services to enable students to make informed stream choices. The results also reveal that the majority of students had relatively little knowledge of available careers and how they are related to subject choices. This is an indication that there are learners who do Physical Science not because of being interested in them. Learners' choice of stream must be informed by their desired goals in life. Learners who follow desired careers strive for better results.

Mandina (2012) stated that in order to address challenges to achieve quality education in rural schools, there should be awarding of financial bonuses, incentives and a hardship and retention allowance to teachers who are willing to teach in rural areas; provision of adequate school infrastructure; provision of scholarships for

teachers seeking to further their education, and ensuring that teacher training institutions have programmes to prepare them for the conditions in rural schools.

2.7.1. Enrichment classes

Learners who do not perform well should be given extra lessons to improve their performance. The DBE (in Limpopo, 2011) pointed out that underperforming schools at Grade 12 level should be provided with extra training conducted by selected educators, curriculum advisors and other specialists from tertiary institutions during winter and spring vacations. Extra lessons help those who do not performing well for them to catch up with the rest of the class. Engelmann (2016) recommended the Direct Instruction (DI) for learners to master content. He defined DI as a teaching model that emphasises well-developed and carefully sequenced lessons designed around small learning increments and clearly defined and prescribed tasks. Learners could be easily assisted, and each learner's challenges could be easily addressed.

Mokoena (2017) indicates that enrichment programmes fail because of the exclusion of learners in planning, lack of diverse content activities in the programme, limited parents' involvement and roles in decision-making around the programme. A successful programme must be planned by all stakeholders involved in education. The involvement of different stakeholders makes all accounts in the outcome of the programme.

2.7.2. Team work

A study by Boakye (2015) indicated that a team could be described as a group of people who work together to achieve the same goals and objectives for the good of the service users and organisations in order to deliver quality service. At school, educators have one specific goal in mind to help learners with their education. Unity among educators could assist to help learners focus on their studies. Educators' approaches in teaching a topic cannot be the same. Learners cannot fail to understand different educators teaching the same subject.

Research by the Wits School of Governance and Bridge (2016) revealed that most schools do not work together. It could be difficult for Physical Science educators to uplift the performance of learners in Physical Science if they work in isolation.

Challenges shared could ease the burden on educators. Phalane (2011) noted that absence of teamwork seems to impact negatively on a significant number of activities at school, and this results in poor performance. Working as a team is very important because educators would assist each other where they experience challenges. Burke et al (2014) indicated that ordinary daily team meetings contribute to teachers dealing with important and necessary conditions for teaching such as specific pupils and social and disciplinary problems in the classroom.

Sparks (2013) found that schools rise and fall based on the quality of the teamwork that occurs within their walls. A school can produce good quality results if teachers are able to work as a team. Approaches in teaching a topic for educators differ because they depend on their knowledge. It is difficult for a person in an organisation to work in isolation and produce the desired quality results as expected.

2.7.3. Monitoring

Monitoring is a continuing function that uses systematic collection of data on specified indicators to inform management and the main stakeholders of an ongoing operation of the extent of progress and achievement of results (Osman, 2002). For schools to produce good results, monitoring must be done regularly. In an article, 'Curriculum Strategy' developed by the Limpopo's Education Department, it is mentioned that school monitoring and support at all levels would be strengthened to ensure that teaching and learning take place effectively. If activities done at school are monitored, the performance could improve, as everyone would be doing his/her duty.

Rammala (2009) suggested that the school management team should ensure that educators identify underperforming learners, monitor their utilisation of study time, and assist in resolving problems regarding their poor performance. They should encourage learners to complete most of their work at school during study time. Assistance of learners at school is important as others (for example, children heading families) have no one to rely on at home.

- The DBE must establish a task team, which should visit all schools to establish and verify their needs in order to allocate the resources needed. The

monitoring strategy can assist underdeveloped schools to be considered first than to be allocated resources like the developed ones.

- The DBE must monitor or revisit the methods of teaching and assessment. The changing of curriculum and subjects that educators teach at school remind us that proper training of educators is an ongoing activity, which must always be done throughout the year. The department must always monitor activities done at school if good results are to be achieved.

2.7.4. Mentoring

Moyle (2016) indicated that mentoring refers to relationships where more experienced individuals share their skills and knowledge with other less experienced practitioners. The less experienced are introduced to the effective way of achieving good results by observing the experienced ones. Mentoring is an effective intervention in professional development programmes, especially when informed by educators' instructional and content needs (Nel & Luneta, 2017). The study also revealed that professional development (PD) revolves around content, curriculum and assessment, instead of focusing on content and instructional challenges that individual educators experience in classrooms. Poor content delivery and instructional methods lead to poor performance by learners. Educators must learn from those who perform well to improve results.

Instructional and content developmental programmes can help educators cope with classroom challenges. When underperforming educators observe the best performance, they can learn good methods that can assist them. Students' achievement in disadvantaged poor-performing schools can be meaningfully improved by mentoring educators (van der Walt, 2016). Mentorship relations of similar background can be more fruitful (Priest & Donley, 2014). Educators with similar challenges must share ideas on how to solve their problems. The experienced and good performing educators should share how they approach the challenging topics with others.

In Physical Science, mentoring increases the retention of diverse groups of learners (Zanieswskie & Reinholz, 2016). Fricke (2008) shows that mentoring was employed

to provide professional development for experienced Physical Science educators at under-resourced schools and provided considerable opportunity for them to improve their competence. The educators' values and attitudes changed because of the mentoring programme provided. The study also indicated that educators have specific needs and practice in unique contexts that can only be effectively identified and addressed by interfacing with them over a long period of time, both in private meetings and during classroom observations. Any positive impact brought about could only be sustained if educators' support provides a continuous process of monitoring. Teamwork amongst teachers in mentoring learners to carry out projects at science fairs informs teachers' content knowledge with more pedagogical techniques (technological knowledge and pedagogical content knowledge), and offers enhanced access to science, technology, engineering and mathematics resources (Mbowane, De Viliers & Braun, 2017).

Educators cannot work in isolation if their main aim is to produce quality results. Mentorship is about producing people who have the creativity, the intellect, the conceptual skills and the personal qualities necessary to provide true transformational leadership in the dynamic teaching and learning milieu (Leepo, 2015). Educators who undergo the process of mentorship are capable of assisting learners in the right way, and results can improve.

2.7.5. Motivation

Tohidi and Jabbari (2012) defined motivation as empowering people to achieve high levels of performance and overcoming barriers in order to change. The motivated learners have the power to achieve more than what they are expected to achieve. Motivation helps learners to focus on their goals. The study asserted that motivation is the driver of guidance, control and persistence in human behaviour. It is part of the educators' pedagogy to develop in students the desire for new knowledge and understanding known as intrinsic motivation (Valerio, 2012). Educators play an important role in guiding learners towards better results. The behaviour of a learner depends on the type of motivation provided. Through their knowledge, educators can guide and control learners to achieve their desired goals.

Learners in rural schools need motivation because there are only few people who are educated, whom they can copy from. The majority of learners' role models are people who are not educated. It is necessary to get people who are educated to help learners understand the importance of education. A learner may be motivated for an action in a particular situation while another learner may not be motivated in the same situation; even the same learner may not be motivated under the same situation at certain occasions (Chauhan, 2016). Though not all learners can be motivated, those who change can help others in future.

2.7.6. Assessment

All learning activities must be assessed to check if their set objectives have been met. When designing a task, an assessment tool must also be formulated to help assess the objectives' achievement. All lesson presentations are done for a purpose and, therefore, should be assessed. Pellegrino (2016) stated that assessments must support classroom instruction and monitor science learning on a broader scale. Learners are taught to acquire knowledge and skills. It is important to assess after-lesson presentation if learners gained the expected knowledge and skills. Remedial activities are necessary to assist those who did not understand much of the lesson because it is important for all to progress together.

Rustaman (2017) noted that there is a closer relationship between science instruction and assessment. All lesson presentations should end with assessments to check their effectiveness. The Physical Science lesson preparation must be done with an assessment tool related to the task. Some activities might require a rubric depending on what is to be assessed. Some lessons can be prepared for skills and knowledge or knowledge only. Most of the activities where skills can be assessed are done experimentally. It is necessary to use assessment guidelines to check the types of activities that should be done and their assessment tools.

A study by Gopal and Stears (2007) indicated that strategies that assess more written work are required if we wish to gain a better understanding of the learning that occurs in science classroom. More written and controlled work can improve the performance of the learners. Learners must be assessed so that they may know what is expected from them. It has been observed that in high performing schools,

there are clearly worked out assessment plans for each Grade, listing all the formal assessment plans for each Grade and the plan is availed to the learners and their parents in the first week of the first term (Leepo, 2015).The expected learners' assessment tasks are known on time for them to get enough time to prepare.

2.8. LEARNING THEORIES.

2.8.1. Constructivism

Reeves, Albert, Kuper and Hodges (2008) pointed out that theories provide complex and comprehensive conceptual understandings of aspects that cannot be pinned down such as, among others, how societies work, how organisations operate, and why people interact in certain ways. The theory of constructivism underpins this study. Constructivism is a theory describing how learning happens regardless of whether learners are using their experiences to understand a lecture or following the instructions. John Dewey is regarded as the philosophical founder of the constructivist approach.

Constructivism alerted science educators the functioning of prior learning and extant concepts in learning new material by stressing the importance of understanding as a goal of science instruction and fostering pupil engagement in lessons (Mathews, 2017). Constructivists believe that learners construct knowledge out of their experiences. They indicated that there is a link between new knowledge and the acquired experience. The constructivist approach emphasizes that the active construction of knowledge by the learner is socially and culturally rooted (Fernando & Marikar, 2017). All learners learn being focused by participating and contributing using their skills. The approach can make learning of Physical Science to be enjoyable to learners. Learners who are actively involved in their studies are likely to perform better.

Educators must be facilitators in the process of learning to help learners achieve their goals. A study by Mathews (2003) stated that appropriate practices must focus on the instructional level of the learner. Educators teaching practices are very essential in learners' progress. Proper use of instructional methods can make learners understand Physical Science content effectively. Mintzes (2012) stated that new instructional strategies are required to expose learners' ideas and help them

acquire a scientific understanding of the world. In rural areas there is a lack of facilities and being creative can lead to better results. Instructional strategies promoting understanding of science must be utilised to expose learners to science issues. Educators must provide opportunities to learners to discuss and share their ideas freely to each other, probing, doing own experiments and other problem solving activities (Singh & Yaduvanshi, 2015).

In order for educators to produce quality results under challenging circumstances, they should reconsider their instructional methods. If educators change their instructional methods in line with challenges faced, learners' performances could greatly improve. Classrooms that practice constructivist activities empower the learners to gain access to their experiences and beliefs that reshape their prior knowledge in the light of the applied course content (Gunduz & Hursen, 2014). Physical Science results can be improved if educators use approaches which can make learners be actively involved during learning. Wholesome changes in instructional methods are needed in improving rural school pass rates (where there are many instructional challenges).

A teaching and learning environment dominated by the constructivist approach provide creative thinking (Ayaz, 2015). Educators must create an environment, which is conducive for learners to learn. Roth (1994) indicated that science learners should be provided with an environment that they can learn to investigate and develop complex problem solving skills. The educators' abilities to cope and produce quality results in unfavourable conditions could assist those who fail to understand that it is possible to deliver under awkward situations. Their capability in producing good results could help stimulate underperforming institutions to do better. In this case, the environment could be manipulated to suit the conditions needed for better education. This theory, if utilised effectively, may lead to an improved education system.

2.8.2. Behaviourism

Fourie, Oberholzer and Verster (1992) stated that the extent of teachers' involvement as educators is dependent on their philosophy of life. The strategies that the educator employs in helping the learners at school are informed by what he values most. That is, educators' teaching approaches dovetail with what they believe

is important. The behaviour of the educator and that of the learners' play is crucial in improving the quality of education. It is for this reason that this study was informed by the behaviourist theory of learning.

Behaviourists regard education as the learning of certain behaviours useful later in life (Fourie et al., 1992). Through their growth stages, children learn from what they observe. Their observation of what others do become part of their life styles. The theory is largely informed by Pavlov's experiments with dogs. Pavlov's observations of his experimental dogs' behaviours led to what he later called *operant conditioning* (responses) (Fourie et al., 1992). This theory is concerned with observable and measurable aspects of human behaviour (Zhou, Smith & Knudsen, 2015). Behaviourists believe that behaviour worth studying is that which can be directly observed. Watson believed that if proper stimuli are presented, the individual could be moulded into any type of person desired (Fourie et al., 1992). In order to improve the quality of Physical Science results in Grade 12, educators' practices and learners' behaviour should be observed. In addition, educators should apply teaching methods that stimulate learners in class.

Even though there might be shortages of resources and other challenges in rural schools, educators should help learners achieve better results. The correct approaches by educators could help learners concentrate on their studies. Learners who behave well should be rewarded by proceeding to the next Grade by year-end. Only good behaviour must be allowed in class as behaviourists believe that behaviour is learned. As with all teaching methods, success depends on each student's stimulus and response and on associations made by each learner. Behaviourist techniques like behaviour modification are employed in education to promote desired behaviour. Behaviour modification elicits better classroom performance from reluctant learners. The learners' performance in Physical Science is susceptible to their behaviour in class. If learners are ill-disciplined, their performance drops. Rewards could be used to reduce bad behaviour among learners as rewarding learners for good performance is good and brings health competition among learners.

Bacanli (2016) posits that behaviourism claims that learning takes place through conditioning. Educators can motivate learners so that they may improve their performance. An educator must always guide learners, thereby conditioning them to working hard for success. Learning is said to take place when there is change in behaviour. Modelling is known as observational learning. Educators who use the modelling method in their classes help learners relate what they learn to everyday life situations. It is an approach that could be used to develop learners' interest in Physical Science. Kaya and Akdemir (2016) state that the behaviourist theory claims that learning is improved by means of establishing a connection between stimulus and behaviour, and that change of behaviour could be enhanced through reinforcement. There must be a good connection between a learner and an educator for learning to be effective. Learners who enjoy or understand educators' lessons pass well. It is the responsibility of the educator to reinforce the learners' interest in Physical Science using the correct stimuli. A stimulus reflects changes in the internal and external states that move the organism. If the organism does not display the related behaviour, conditioning that can cause it to change the environment in which it lives does not occur. Bacanli (2016) defined reinforcement as a process of increasing the possibility of an organism to display behaviour to a certain stimulus.

Kaya et al. (2016) said that learning is a method of adapting to current social conditions, rules and cultural needs. They further asserted that psychologists define learning as the more or less permanent change of behaviour that occurs at the end of experience. The experience that educators gain by working in under-resourced rural schools helps them create effective teaching methods.

2.9. CONCLUSION

Chapter 2 focused on literature related to practices and challenges that face Grade 12 Physical Science educators. The data collected was divided into sub-headings related to the study objectives and analysed. The study objectives are: factors affecting Grade 12 Physical Science learners' performance; challenges facing Grade 12 Physical Science educators; strategies used by Grade 12 Physical Science educators to improve Physical Science results; and the educators' classroom teaching practices. This chapter also outlined the theoretical framework vs

Ecological theory and the DBE's policy in rural schools. The next chapter focuses on the research design and the methodology that was adopted by the study.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1. INTRODUCTION

The previous chapter focused on literature where studies related to this study were reviewed. It also conceptualised 'entrepreneurship education' and outlined the philosophy underpinning entrepreneurship education. It also dealt with this study's theoretical foundation, (ecological theory) and the DBEs' policy in rural schools. The current chapter focuses on the research design and the methodology used herein. That is, the research design, methodology and data collection procedures are discussed in detail. The description of the study population, sampling procedure and the data analysis technique are explained extensively.

3.2. RESEARCH QUESTIONS

This study was guided by the following research questions:

1. What are the factors that affect Grade 12 learners' performance in Physical Science in Vuwani's rural schools?
2. What are the challenges faced by Grade 12 Physical Science educators in Vuwani's rural schools?
3. What strategies do Physical Science educators use to improve results at Grade 12 level?
4. How do teaching practices in the context of classroom setting and interaction (and behaviour tendencies) between the educator and his/her learners, and amongst learners themselves, affect Grade 12 learners' Physical Science performance?

3.3. RESEARCH METHODOLOGY

Methodology is a systematic way to solve the research problem (Kotari, 2004). In order to solve a problem in the correct manner, there must be steps or procedures to follow. Methodology guides and provides approaches on how to perform activities

(Mohajan, 2017). It outlines all the procedures undertaken to solve a problem. The study adopted an interpretivist paradigm. Huitt (2011) defined a *paradigm* as a pattern or model of how something is structured and shows how parts function and relate to each other. In an interpretivist paradigm, the emphasis is placed on understanding the individuals and their interpretation of the world around them (Kivunja & Kuyini, 2017). I interacted with the participants in order to understand the ways they teach learners. I blended in during lesson presentations as I observed them teach. The choice of the research design and methodology below was informed by this paradigm. In this study, the methodology includes population, sampling procedure, data collection methods and data analysis. The following steps were adhered to in order to solve the research problem.

3.4. RATIONALE

The majority of South African learners attend schools in rural areas where poor performance in Physical Science is still high. As a developing country with shortages of skills in engineering and medicine, more learners are required to study Physical Science in order to enrol for such professions. Poor performance in Physical Science subjects in rural schools might discourage capable learners from choosing such subjects. It is crucial to look into factors that affect the learner's performance at Grade 12 level in Physical Science if we are to develop our country. Educators play an important role in the performance of learners. It is important to remember that educators' satisfaction is directly linked to the learners' performance. If educators cope with challenges, learners' performance improves. Their strategies used to improve results and their classroom practices should be monitored in order to understand what is happening in rural schools. Some schools there lose many learners to town ones.

Drastic steps should be taken to ensure that quality results are produced in rural schools. No such studies have been done yet in this district. While available literature has focuses more on challenges teachers experience in the teaching of the science subjects, not much has been written about the teaching techniques, classroom setting, interactive behavioural tendencies between educators and learners and among learners in class.

3.5. PARADIGM APPROACH

A paradigm can be considered as a philosophical perspective that guides scholars and researchers in their work (Addae & Quan-Baffour, 2015). The study adopted an interpretivist paradigm. Kivunja and Kuyini (2017) indicated that in an interpretivist paradigm, the emphasis is placed on understanding individuals and their interpretation of the world around them. Reality of the situation in rural schools was interpreted after interviewing and observing educators' practice to discover underlying meaning of events. I interacted with participants in order to understand the ways they teach learners.

3.6. RESEARCH DESIGN

Bhattacharjee (2012) defined a research design as a comprehensive plan for data collection in an empirical research project. The study adopted an ethnography research design. Maree (2015) explained that the aim of ethnography is to describe a culture or a way of life from the perspective of people by making sense of the inherent meaning of gestures, displays, sayings and everything else that has some implicit or tacit meanings in the culture. The researcher observed the educators' practices and challenges they encounter at school. It assisted the researcher to understand their ways of teaching, which were not known.

3.7. QUALITATIVE APPROACH

Maree (2015) indicated that qualitative research as a methodology is concerned with understanding the process and, the social and cultural contexts that underlie various behavioural patterns. The researcher chose qualitative research to understand the practices and challenges the Physical Science educators face in rural schools. An Interpretivist paradigm is a methodological approach connected to a qualitative way of collecting data (Thanh & Thanh, 2015). Qualitative methods aided in knowing experiences and perceptions of educators teaching Physical Science in rural areas. In order to clearly understand the situation, the researcher carried out interviews and made some classroom (teaching) observations.

3.8. POPULATION OF THE STUDY

Welma, Kruger and Mitchel (2005) indicated that the population of a study may consist of individuals, groups, organisations, human products and events or

conditions to which they are exposed. This study's population were Grade 12 Physical Science educators. The conditions to which they are exposed include, *inter alia*, factors that affect the learners' performance, the challenges they face while teaching Grade 12, strategies they use to improve Physical Science results and their classroom practices.

3.8.1. Target population

Only Grade 12 Physical Science educators were considered for this study. The population of the study comprised Physical Science educators from the Vuwani Cluster. Vuwani is a rural area located in the Vhembe District, Limpopo Province.

3.8.2. Sampling procedure

Mugo (2002) defined sampling as an act, process, or technique of selecting a suitable sample, or a representative part for the purpose of determining parameters or characteristics of the whole population. To conduct a research using the whole population can be too expensive. The part sampled represent the views of the whole population and this minimises the cost of conducting a research. The researcher used a purposive sampling procedure to select educators that offer Physical Science at Grade 12 level.

Maree (2015) indicated that purposive sampling means selecting participants according to pre-selected criteria relevant to a particular research question. Pre-selected criteria used were to choose Grade 12 Physical Science educators as they are relevant to the study sample. Purposive sampling is a selection of participants based on knowledge of the research problem, and this allows the selection of appropriate persons for inclusion (Ali, 2014). The selected Physical Science educators provided relevant information.

All public schools offering Physical Science in Grade 12 in the Vuwani Area were considered for sampling. For this study, ten Physical Science Grade 12 educators from purposefully selected schools in the Vuwani were considered. In order to sample ten schools, the names of 49 schools were put in a container. The first ten to be picked from the container formed the sample. In situations where educators

shared the subject, only one was allowed to participate in research. The sampled educators agreed to participate in the research.

3.9. DATA COLLECTION PROCEDURE

A semi-structured interview schedule was used to collect data from face-to-face interviews. It guided the researcher in collecting correct data required for the research. The interview schedule comprised of two sections. The first section was about the personal information of the participants and the second section consisted of questions which were divided according to objectives. In each objective probing was done to seek clarity from the participants. An interview schedule is attached as an appendix.

Interviews were conducted with the study sampled and used to collect data regarding the phenomenon under study. Interviews were conducted at the schools where the participants are working. A place where there could be minimal distraction was chosen in order for the participants to be comfortable. Before interview participants were assured of confidentiality. Participants were also told about the format of the interview. The interviews were recorded using audio recorder after permission was granted by participants, and each interview took between 20 and 40 minutes. For some participants, appointments were made twice or three times due to various reasons. Two participants later withdrew and only eight took part in interviews.

Observations were made during the interviews on issues that were deemed relevant to the study. An observation sheet was used for this purpose. Maree (2015) defined observation as a systematic process of recording the behavioural patterns of participants, objects and occurrences without necessarily questioning or communicating with them. Lesson observations were done without any interference from the researcher. The educators were observed for their teaching approaches, lesson preparation, classroom set up, resources used, learners' involvement, language use, assessment and feedback. The researcher used an audio recorder to record the presentations so that disturbances may be minimal. The researcher also sat at the back row as a passive participant during the lesson proceedings. Notes were taken during observations. Also observed were educators' teaching techniques

and the interaction and behavioural tendencies between the educator and the learners, and amongst learners. Only seven lesson presentations were observed because three declined. An observation sheet is attached as an appendix.

3.10. DATA ANALYSIS

After collecting the data, it was analysed. Flick (2013) defined qualitative data analysis as the classification and interpretation of linguistic (or visual) material to make statements about implicit and explicit dimensions and structures of meaning-making in the material and what is represented in it. The data obtained through the interviews were analysed *verbatim*. After collecting of data, the researcher listened to what the participants said in audio recorder and writes the data in a book word for word. The researcher listened to the audio several times to check if the data has been captured correctly. The data was then cleaned to remove repetitions. Coding was also used to organise and analyse it. Coding was used in order to maintain anonymity of participants. Maree (2015) sees coding as a process of reading carefully through one's transcribed data line by line and dividing it into meaningful analytical units. The data were divided into themes for analysis.

3.11. MEASURES OF TRUSTWORTHINESS.

According to (Satu, Maria, Outi, Tarja, Kati & Helvi, 2014) it is important to scrutinizing every phase of the analysis process, including the preparation, organization, and reporting of results to give a reader a clear indication of the overall trustworthiness of the study. The trustworthiness of the research project has been outlined from data collection to reporting results using the steps; credibility, transferability, dependability and conformability.

3.11.1. Credibility

Credibility ensure that the study measures or tests what is exactly intended to measure (Andrew,2004). Questions related to the study aims were written on interview sheet so that the relevant data be collected from participant. According to Cope (2014), credibility refers to the truth of the data or the participant views and the interpretation and representation of them by the researcher. To ensure that the data was accurately reported, the researcher visited the institutions where the participants

work and record their views in relation to the study. Only those who were teaching physical sciences in grade 12 were considered.

3.11.2. Transferability

Satu et al. (2014) indicated that transferability relies on the reasoning that findings can be generalised or transferred to other settings or groups. It deals with whether the findings of the study can be applicable in other situations. The study was conducted in schools which are in rural areas. Participants were educators who teach on rural schools. The interviews and observations were conducted over a period of one month. All relevant data collected regarding the study will be available for other researchers.

3.11.3. Dependability.

Andrew (2004) indicated that dependability is more of reporting in detail the processes in which the study was done, thereby enabling a future researcher to repeat the work, if not necessarily to gain the same results. The researcher must outline all steps followed to get the results. The researcher used observation method and face to face interview in order to understand the situations of the participants correctly. Observation sheet and interview schedule are attached as appendix for future researchers' referral.

3.11.4. Confirmability.

Confirmability is based on the perspective that the integrity of findings emerge from the data and that the researcher has adequately analysed it (Susan, 2005). The researcher used audio recordings and notes to capture participants' views and ensure that conformability is achieved. Ideas of the participants had been used to analyse the findings.

3.12. ETHICAL CONSIDERATIONS

The research ethics, procedures and policies of doing research at this university were observed. Kamat (2006) acknowledged that the researchers have an obligation to honour the trust that their colleagues place on them, and the ways that serve the public. The participants were assured that interviews were confidential, and their names would not be revealed. Orb et al. (2001) noted that the research process

creates tension between the aims of the research to make generalisations for the good of others and the rights of the participants to maintain privacy. The researcher asked participants to take part voluntarily, thereby avoiding violating their rights. Permission to conduct the interviews was requested from the Vhembe District's Department of Education. After obtaining that permission, appointments were arranged.

3.13. CONCLUSION

In Chapter Three, details of the research design and the methodology were outlined in detail. The data was collected through face-to-face interviews. The following chapter analyses data obtained during field work and while observing the teachers teaching. Data from interviews was coded for easier scrutiny.

CHAPTER FOUR

ANALYSIS, PRESENTATION AND INTERPRETATION OF EMPIRICAL DATA

4.1. INTRODUCTION

In Chapter Three, the focus was on research design and methodology. This Chapter analyses data obtained from respondents through interviews and observations. Data from interviews were elicited using an interview schedule and for observation, the observation schedule was used. The data were coded for easier and thorough scrutiny. The analysis assisted in achieving the objectives of the study. Data analysis was done qualitatively. Four female and four male educators from different schools in Vuwani participated in the study. Data is analysed in four themes following the study's aim. Data for the three themes were collected through interviews, whereas the last theme's data were gathered through lesson observations.

4.2. Respondents' Personal Information

4.2.1. Respondents' sex

Table 4.1 Sex

Sex	No. of respondents	%
Male	4	50
Female	4	50

Table 4.1 shows the respondents' sex. It is important that the DBE consider all gender representation in the teaching field as required by the government. Gender discrimination is a violation of human rights, according to the government. According to this table, 50% of the respondents were males and 50% females. This 50-50 representation is a balanced scenario between male and female teachers who teach Grade 12 Physical Science subjects. The table reflects that given equal opportunities at work, both male and female teachers can teach Grade 12 Physical Science subjects. That is, everyone has an equal opportunity to teach Physical Science in higher Grades.

The sex representation could equally enhance the learners' desire to choose to do Physical Science. Girls could easily choose to do Physical Sciences as they would see one of their own doing that. The learners could be motivated to follow science careers, a situation that would help reduce the skills shortage currently faced by the country. Mdlolo (2017), however, believes that women are still under-represented and marginalised in science-related fields. Thus, increasing the number of the female Physical Science learners would boost their percentage in this field of study. Women comprise a minority of the Sciences, Technology, Engineering, Mathematics and Medicine workforce (Holman, Stuart-Fox & Hauser, 2018). Prioritising the balance of both sexes is important to minimise biases.

4.2.2. Respondents' age range

Table 4.2. Age

Age	No	%
21-30	1	12,5
31-40	1	12.5
41-50	4	50
51-60	2	25

Table 4.2 presents the respondents' age. Only two respondents were below the age of 40. Six of the eight respondents were above 40 years of age. This shows that in many schools, young educators are not given the opportunity to teach Grade 12. Only experienced educators are considered for teaching Grade 12. The gap indicates that in future, there could be problems experienced in many schools as young educators are not mentored to teach Grade 12.

Moyle (2016) indicated that mentoring refers to relationship where more experienced individuals share their skills and knowledge with those less experienced. The experienced educators should mentor newly employed ones so that they develop the required skills and knowledge. If educators uplift each other, the Physical Science results could improve. Educators should work as a team to help improve the results here. The absence of teamwork seems to impact negatively on a significant number of activities in the school, which results with schools performing poorly (Phalane,

2011). Working as a team could help close the age gap as teachers would always share ideas on how to assist the learners favourably.

4.2.3. Educational qualifications of the respondents

Table 4.3 Educational Qualifications

Educational Qualifications	No.	%
Matric	0	0
Teaching Diploma	1	12,5
Advance Diploma in Education	4	50
B.Ed (Hons)	3	37,5

Table 4.3 indicates the respondents' educational qualifications. It is important to reflect on the educators' qualifications so that we can understand the reasons behind the learners' poor performance in rural areas. Learners can perform better or worse due to the educators' knowledge. Here, only one respondent had a teaching diploma while 50% of the respondents hold an Advanced Diplomas in Education and 37.5% have B. Ed (Hons). The qualifications indicate that educators are interested in developing themselves. This is positive, indeed, as it would help uplift the learners' performance. Selvaratnam (2011) postulates that the successful implementation of the curriculum requires that competent teachers in the cognitive (intellectual) skills, and strategies are needed to effectively teach science. It is through learning that educators could be both skilful and knowledgeable. Competent educators could empower learners with the correct knowledge required to progress.

4.2.4 The respondents' teaching experience

Table 4.4 Experience

Experience Interval	No. of respondents	%
1-10	1	12,5
11-20	2	25
21-30	5	62,5

Table 4.4 shows the respondents' teaching experience. Only one respondent has less than 10 years of teaching experienced. New comers to in the teaching fields are barely given Grade 12 classes. It is important to involve new educators so that they can learn from those who are experienced. The majority of the respondents (62.5%) have more than 20 years' teaching experience at Grade 12 level. The respondents' teaching experience is very important as it can contribute to good classroom practices. Experienced educators have better skills and knowledge on how to teach learners. Students taught by experienced educators show better outcomes as compared to those taught by the less experienced (Haider & Hussain, 2014). They know how to deal with the challenges they encounter while teaching. If educators are experienced, they are able to use different approaches to make learners understand what they want to convey. If educators work together at school, they are likely to produce good results.

4.3. QUALITATIVE ANALYSIS

THEME 1: CHALLENGES FACING GRADE 12 PHYSICAL SCIENCE EDUCATORS IN RURAL SCHOOLS

All eight participants were asked to state the challenges they encounter while teaching Physical Science in Grade 12 at their schools. These challenges are mostly similar in different schools. Only a few participants mentioned different challenges. Their challenges were written as sub-themes. The participants' different views were then analysed.

Sub-theme 1.1:Lack of resources

Five of the eight participants mentioned lack of resources as one of the challenges that affect their teaching in Grade 12. The following are some of their *verbatim* responses.

Participant 1: Another point is the shortage of scientific equipment in rural areas. We find that we don't have the instruments to elaborate on our teaching. No support from the SMT as they don't buy the equipment for us.

Participant 3: *Science is a practical subject. There is a need for laboratories here. For practicals, learners go to the science centre. There, many learners are just given results.*

Participant 5: *The biggest challenge that we face is the lack of laboratories, Physical Science equipment and chemicals. Without these, normally we only teach theory. It is difficult for learners to grasp concepts if there are no experiments performed. If we have laboratories, equipment and chemicals, it would be easy for learners to understand science. Because they will do the experiments themselves and see the results. It is easy to grasp the idea because learners will have done it by themselves, unlike when I teach them theoretically where they can't even visualise what a test tube looks like. That is the biggest challenge we face here.*

Participant 6: *Lack of scientific resources. They supply outdated books. Science is experimental based. There is need for apparatus. For experiments, learners are taken to the science resource centre. At the centre, they are not given the chance to handle apparatus. They become spectators.*

Participant 8: *The school where I work is more rural. There are so many challenges. There is lack of infrastructure and no laboratories. The other one is an issue of textbooks. We use shallow textbooks and lack of study guides for learners. When we teach, we have to use the language, which is good for learners to conceptualise. The other one is the issue of calculators. Calculators that they are given by the department do not last long. Those are the challenges that learners have at our school.*

Most of the participants indicated that their schools lack resources, which could enable them to teach effectively. Schools could perform better if educators are given correct resources to use. Ngema (2016) cited the lack of resources as one of the

factors that make learners perform poorly at school. The Department of Education and all stakeholders should work together to eradicate the problem of the shortage of resources. Learners in rural schools do not get the proper support, and this leads to more learners performing badly. As a country, if learners develop to their full potential, their career choices might help develop this country.

When probing the issue of lack of resources, participants indicated that there is a resource centre which schools visit to do experiments. The participants stated the following as relating to the resource centre they visit for experiments:

Participant 3: At our circuit, we organise learners to visit the Vuwani Resource Centre where we perform experiments for learners. When we arrive there, there would be many other schools. It is also difficult for them to conduct the experiments in such a way that each and every learner benefits. Sometimes they just give learners the results without doing the experiments. If, as a school we have a laboratory, we can do our experiments there, where our learners would greatly benefit.

Participant 5: Around our school, we have a science resource centre. We make appointments to take our learners there, but it is not as fruitful as we expect. The resource centre is used by many schools, and many schools would come for the same experiments in a day. Learners are grouped in huge numbers and some of them cannot even notice what is happening. They just take the results and come back because it is a prescribed experiment and there is nothing that one can do. We just do that to obtain marks for the learners.

Participant 6: On that issue, we arrange transport for the learners and we dump them in a particular area. Nearby, there is a science centre which is under construction (by the local university). The problem is that when we go there, there are a lot of learners who end up doing nothing. In short, we have a challenge, they just go there to visualise from a distance. They tend to be spectators.

The science resource centre utilised by schools in that area fails to accommodate large numbers of learners who visit the institution for experiments. They visit the centre to observe how experiments are done. The fact that more learners are taken to the science resource centre indicates that schools are interested in producing quality results. In Grade 12's Physical Science final examinations, there is a question that requires skills and knowledge of experimental activities. The learners who do not do experiments struggle to answer such a question. The centre must allocate learners enough time to perform their experiments.

Sub-theme:1.2. Curriculum change

The curriculum of the country keeps on changing. It changes because the country wants to produce competent and relevant world-class skilled generations. It emerged from other participants that the curriculum change is a challenge. They stated the following regarding the said curriculum change:

Participant 3: Number two, as the system of education is always changing, there is a need for in-service training so that we can fill the content gap. By so doing, we increase the performance and improvement of the results in Physical Science.

Participant 7: The last part might be of curriculum change. Sometimes we are not fully equipped with the curriculum change, yet we are supposed to teach learners based on the new curriculum. It is not functional because we are not well versed with the topics.

When the curriculum changes, educators must know what exactly changed. They must know what they are expected to do. Educators who lack proper knowledge of such a change cannot assist learners develop to their full potential. Any curriculum change should also involve changes in teaching and learning methods in order to cope with newly introduced or transformed content (Pastory, 2016). Despite the changes in curriculum from NCS to CAPS, educators have not changed their teaching approaches (Gudyanga, 2017). They still use the same approaches because they are not given enough training. They rely on the same old approaches. It is the aim of any educator to share their knowledge with learners. Jadhav and

Pantankar (2013) indicated that the educator is the mediator between curriculum and the learners. Teaching using wrong approaches can lead to the learners' poor performance. Some learners fail because educators do not know how to teach certain topics correctly.

While probing, the participants were asked if they are given enough training when the curriculum changes. The following are some of the responses to this:

Participant 3: During the training, the time is not enough to grasp all the content. One finds that we are given two to three days for paper 1 and paper 2. The training is not enough.

Participant 7: No, we can have only one or two days' training. Topics might be the same, but the way we teach is not similar to the previous curriculum. It then gives us problems in producing good results. There are also new topics as well.

Educators are not given enough time for training on the new curriculum changes. This makes educators to take a long time to adjust to the changes, and this affects the learners' performance. Pastory (2016) indicated that changes in curriculum at schools, particularly in science subjects, do not consider the availability of teaching and learning materials. In rural schools, change in the curriculum does not change the use of any resource. Lack of teaching and learning resources and proper training hinder proper implementation of curriculum changes. Educators need thorough training so that they can empower our learners. If they transfer the right knowledge to learners, the quality of education would improve.

Sub-theme 1.3: Educators' workload

Educators' workload includes teaching and management activities. Two of the participants pointed to the workload as a challenge at their school. High workload leads to poor service rendered. Participants had this to say:

Participant 2: I teach Physical Science, Grades 11 and 12. I also teach life sciences, Grades 11 and 12. Being overloaded with work makes us

lose focus, and thus we concentrate more on Grade 12 at the expense of the lower Grades. Our school is very small and has many streams.

Participant 6: Looking at my workload, I handle NS Grade 8 and Physical Science Grades 10 to 12, all papers. I do this alone.

The participants indicated that they are not satisfied with the amount of work they are allocated at their schools. One participant indicated that their workload problem is due to that their school is small and has more streams. If the school is small, they have to reduce streams in order to reduce the workload. In this way, educators would work effectively. If participants feel they are overloaded, their output would not be satisfactory. School leadership with few learners should reduce streams in order to make educators teaching effectively.

Another participant pointed to the issue of teaching Physical Science in the FET band alone. It cannot be easy to improve Physical Science performance if learners rely on one educator. If educators share subjects, they could help one another. Learners who fail to understand one educator might perform better with the other. Zenda (2016) noted that the high workload is one of the factors that lead to a high failure rate in rural areas. When they have to attend to other Grades, they would be exhausted. The interaction with the research participants revealed that most of the schools suffering from high workloads are small and have many streams.

Sub-theme 1.4: Curriculum support

For educators to produce quality results, they need maximum support from the school management team. The SMT must supply educators with all resources needed to execute the curriculum. The participants stated the following pertaining to challenges they encounter while teaching:

Participant 2: The Headmaster is not oriented to science, and hence it's difficult to get support from him. One cannot get financial support to buy apparatus. They feel it's worthless to buy science equipment.

Participant 5: *It is hard to get support. It depends on what the Head of the school supports. The support I get is minimal.*

Participant 7: *The other point might be support from the SMT. One finds that whenever we need support in terms of motivating learners, they need to be compensated. If we need a person who can motivate our learners, the SMT says they don't have money to pay for that particular person. It is discouraging.*

Some educators do not get sufficient support from the SMT. If educators are not properly supported on their daily duties at school, learners suffer the most. There is a need to strengthen curriculum support for the production of competent learners. The school leadership should provide educators with the necessary science resources in order to teach effectively. The DBE (2016) pointed out that the HOD's job is to engage in class teaching, be responsible for the effective functioning of the department and organise relevant and related extra mural curricular activities so as to ensure that the subjects, learning area or phase and the education of the learners is properly promoted.

An HOD is an immediate senior member of the SMT to which an educator must lodge grievances. The educators' proper support by the school leadership can lead to the production of good results. In order to properly teach the Physical Science, more resources must be available at school. Although there might be no laboratory at school, the basics of teaching Physical Science must be provided. This can help develop interest in learners and improve their performance.

Sub-theme 1.5: Classroom environment

The classroom environment entails the conditions in which teaching and learning take place. A good environment makes learning comfortable. Some educators in rural schools teach in unfavourable conditions. The following statements were voiced by some participants:

Participant 5: *Lack of classroom. They have broken windows and doors.*

Participant 6: *Yes, there are several challenges I encounter, one of them is the science classroom environment, by that I mean the classroom atmosphere or the learners. Some of us conduct lessons under the tree and the shacks where we don't have any good resources nearby or in the walls, where it is conducive for the periodic table. Whatever is related to science, we do not have the place to hang them to create the science classroom environment where learners can feel that they are in a scientific room.*

Maemeko, Nkengbeza and Ntabi (2017) indicated that the poor learning environment is a factor that contributes to the learners' low performance. Some learners have to battle in order to learn. It can be difficult to adhere to the pacesetter if one still teaches under trees because sometimes teachers are forced to miss classes. Sayani (2015) indicated that it is the responsibility of the educator to help learners gain knowledge, skills and critical thinking by implementing various innovative strategies, but under a positive and conducive environment. The school must be supportive of educators to improve the results. The proper classroom environment is necessary for educators to deliver their mandate.

Sub-theme:1.6. Overcrowding.

An overcrowded class makes it difficult to teach effectively. Learners in such classes cannot be easily controlled because the educator cannot easily reach all of them. Two of the participants indicated that they are affected by overcrowding.

Participant 2: *More learners now do sciences and this leads to poor performance.*

Participant 5: *I teach them under one roof, a single classroom where I cannot move in between. I stand in front to write on the chalkboard. It is hard, I can't even move to provide individual help to learners.*

Overcrowding leads to both educators and learners performing poorly. Educators cannot thoroughly execute their duties when overloaded and can only use the lecture method in their teaching. The effectiveness of assessment is also compromised

because the educator cannot check if all learners follow the instructions. In Physical Science, teaching needs to focus on improving individual knowledge. The educator cannot help those who struggle to understand if the class is overcrowded. Shah (2012) indicated that small classes are easy to manage. Educators prefer a class they can control and easily assist all. Such classes make learning effective because learners are easily assisted.

THEME 2: FACTORS THAT AFFECT GRADE 12 PHYSICAL SCIENCE LEARNERS PERFORMANCE IN RURAL AREAS.

2.1. Sub-theme: Parents' involvement

In order to attain quality results, parents must be part of the education of their children. They must know their children's activities at school and home. The participants mentioned the following regarding their relationship with parents.

Participant 1: Some of the parents come, but others do not because they do not check their children's books. For them, if the child goes to school, it is okay. We do call them, they just tell us that i can see my child studying'.

Participant 3: It is very difficult for parents to be involved in their children's teaching and learning activities. Most of the families are child-headed. Their parents are in other provinces. Some learners are orphans due to some diseases. Parents who are available at home usually come, but others say they don't have time to waste.

Participant 5: There is a high failure rate because learners do science thinking that they will get employed. If we call parents, they feel learners just do it. The parents' involvement in supporting their children's education is not adequate. They only support them financially.

Participant 4: Parents are not supportive. Every month, learners write tests and we release a schedule for their performance. If parents are

called to check their monthly performance, they don't come. If there are 50 learners, only 10 of them come.

Participant 6: Parents are not supportive. They only pay money for trips.

Lack of parents' involvement in their children's education is of great concern. Masekoameng (2010) noted that parents do not participate in the education of their children because they view it as the responsibility of the school. Most learners do not get sufficient educational support from their parents. Obeta (2014) revealed that parents, no matter how their busy schedule, should make out time to sit down with their children and check their academic work, direct them where necessary, and discuss the academic problems noted with their teachers or school guidance counsellors to detect the learners' weaknesses early enough for a remedial action. Parents must support their children in all school activities. Educators alone cannot assist learners to achieve their best in education. If children are not supported, they lose focus in their studies. There are learners who cannot be supported at home because they head families. Dhurumraj (2013) indicated that most learners come from underprivileged homes and receive very little support from their parents.

However, there are parents available in assisting their children. It emerged during interviews that some parents do their best to ensure that their children are focused at school.

Participant 8: The other thing is that when we talk to parents, we encourage them to give their children tips and how to study and, how to support them. We encourage them to buy calculators and study guides. We encourage parents that when they are at home, they have to form study groups where their children would gather in one household and utilise it as a study point so that when they need assistance, they can call a teacher to assist. We hope at the end of the year, we would reap the good results.

Those parents who help their children must be encouraged to do so. If not encouraged, they might join those who are always negative about their children's education. It is important for parents to monitor their children while studying. Learners can possibly achieve their goals without failure when properly supported at home and school. There must be better cooperation between children, parents and educators. The education's goal is to produce a competent learner. Parents and guardians at home should know that they are their children's supervisors.

There are parents from both privileged and underprivileged communities who are concerned and employ a variety of strategies to get involved in their children's education, both academically and socially (Manilal, 2014). Parents who assist their children must be motivated to keep doing so. Those who are not involved in helping their children must be guided on how to assist them. Some parents do not assist their children because they do not know what is required of them. If parents assist their children, they can surely focus on their studies. Children need guidance from their parents in order to achieve their goals.

2.2. Sub-theme: Learners absenteeism

Two participants mentioned absenteeism as one of the factors that lead to poor performance in the Physical Science in Grade 12.

Participant 2: I think another issue is absenteeism. Nowadays, there are no strict rules to make learners attend lessons, consequently. Learners miss lessons. In science and maths once one misses one lesson, the next day they won't be able to link with the new topic. Absenteeism contributes a lot in the learners' failure.

Participant 7: Learners contribute to the high failure rate because of their attendance. Most of Grade 12 learners do not attend extra classes, even normal ones on that.

Learners who abscond from school contribute a lot in the high failure rate. Mboweni (2014) noted that learner absenteeism is one of the causes of poor academic performance. Sahin, Arseven and Kilic (2016) revealed that family problems and

parents' lack of education are some of the factors contributing to absenteeism. Rural schools always face a challenge on absenteeism because some parents are not involved in the education of their children. It is a matter of concern as some families are headed by children. Educators have no special programmes to help learners who fail to show at school. In order to improve the learners' performance, it is important to come up with strategies that can curb absenteeism. When asked about how they help those who absent themselves, one respondent said:

Participant 2: There is nothing we do because we rush for pace-setting. You can find that only one learner is absent and the rest are present. It can be very difficult to assist such a learner.

The learners' poor performance at school due to absenteeism must be solved. The DBE wants all learners to pass at the end of the year. There is also a need for special programmes to help those who failed to show up at school. Some learners fail to come to school because of illness, for example. They cannot be left out on their own when they are back at school with such serious challenges. Subject educators must assist such learners to catch up with others.

2.3. Sub-theme: Learners discipline

Learners' behaviour plays an important role in their performance at school. One of the participants said that discipline is a factor that contributes to poor performance in Physical Science.

Participant 2: There are lots of activities that happen outside the classroom, like the issue of social media. Learners nowadays are hooked to social media. They spend most of their time on social media than concentrating on their school work. Most of them do not listen to us when we guide them.

Participant 3: Another one which contributes to poor performance is that our learners nowadays are not disciplined. They are not dedicated to teaching and learning activities. Our learners are not motivated. They lack self-discipline.

Learners who are not obedient are difficult to teach. They do not take instructions from their educators. Black (2016) indicated that public schools suspend millions of learners each year because of ill discipline. Learners are suspended for serious offences they committed at school. Learners misbehave at school due to a variety of reasons like peer pressure, overcrowding, lack of parental support, inability to do their work, poverty, lack of motivation to succeed, disrespect, moral decay, not being engaged in the formulation of rules, rules not being enforced, unmonitored TV viewing, child-headed families, lack of effective disciplinary measures, poor perceptions of the aims and principles of schooling and poor home upbringing (Masingi, 2017). Learners cannot develop fully without the elders' proper support. Rules must be enforced to learners so that they may achieve what we want them to achieve. They must also be monitored at home so that they may stick to what is required of them.

If learners disregard their educators at school, we cannot expect good performance from them. Such learners cannot write activities assigned to them by educators. They cannot take instructions from someone they undermine. Masekoameng (2010) noted that learners' ill-discipline negatively affects educators such that some even consider leaving the profession if given the opportunity to do so. If schools lose many educators, there can be crisis as there are those schools that have unfilled vacant posts. The DBE, parents and educators must work together to minimise the issue of ill-discipline. The school environment must be conducive for all stakeholders in order to produce quality results in Physical Science at Grade 12.

2.4. Sub-theme: Learners commitment in studying

Studying is a key to better performance in Physical Science. Without practicing, it can be difficult for learners to perform well. Some participants cited lack of studying as the cause of poor performance in Physical Science. The participants voiced their concerns thus:

Participant 1: *Learners read only when they write formal test.
Homework and classwork are copied from others.*

Participant 2: *Learners are not motivated. They are very lazy and hence poor performance.*

Participant 4: *Learners are not dedicated to their work. After school, they don't read. They don't revise. They just relax. It makes them forget what they learned. Learners read when they are told that they are going to write a test. In the Physical Science, learners must read every day. They must practice every day because there are some problems to be calculated. If they do that every day, the results can improve. In the Physical Science, there is no cramming. Most of the problems need calculation.*

Participant 5: *Learners must read. Learners must practice. They must work an extra mile. They are not dedicated to their work. They go home and relax. They read if there is a test. They must read every day. Learners do not perform well because they are relaxed. They are lazy.*

Participant 7: *The other issue that contributes to poor performance might be the copying of homework from other learners. Even if we give them feedback, it is of no use because the work was just copied from someone.*

The statements by the participants show anger when they think of their learners' commitment in studying. Learners do not write activities or study, and this lead to a high failure rate.

Educators seem to have no idea on how best to help learners. The culture of teaching and learning must be encouraged. Educators must remember that it is their task to make learners achieve their goals. They must orientate learners to focus on educational matters. Educators must develop strategies to help learners focus on their studies if they want improvement in school results. If they relax and leave it to parents, there would be no progress at school. Learners spend most of their time at school. For learners who do not do school activities, parents must be called so that they may discuss on how best to assist these.

It is the responsibility of parents or guardians at home to make sure that learners do have time to study. They cannot only study while at school, so parents must assist learners to study. The gadgets that make them lose focus must be controlled. If educators and parents work together, learners' performance can improve. The learners' progress depends on the relationship between the school and parents.

2.5. Sub-theme: Qualified for Progression (QP) learners

The DBE has introduced a policy that outlines that learners cannot fail twice in one band. There are conditions such as the learner must not be absent for more than 20 days a year and the child must pass the language of teaching and learning, and also at least four subjects. Consequently, it has become easier for learners to progress to the next Grade. Some of the participants had the following views on the learners' QP:

Participant 3: The performance is low; the contributing factor is one of the QPs. Learners are progressed to Grade 12 with a content gap. It is very difficult for those learners to cope with the next Grade having poorly performed the previous one.

Participant no 7: The issue of learners promoted to the next Grade even though they fail results in poor performance. If a learner fails Physical Science in Grade 10 and 11 and then be promoted to Grade 12, obviously we will not get good results in the Physical Science.

Participant 8: The performance is low; the contributing factor is that one of the QP's. Learners are progressed to Grade 12 with a content gap. It is very difficult for those learners to cope with the next Grade. This year, the performance might be very low compared to the previous years.

Educators who teach Grade 12 face a challenge in teaching QP learners. The DBE did not put in place a special programme to help such learners to be at the same level with others. Their educational gap remains, yet they progress after having failed the subject. Such learners are likely to fail again if there are no intervention

strategies implemented. It lowers the performance of other learners, as they know that if they fail once, the only Grade they can fail again is 12. It cannot be the responsibility of the subject teacher to formulate strategies to improve the performance of such learners. In this sense, one of the participants said the following:

Participant 3: *When I get time, I organise with my learners to teach them during studies, but the content gap with the QP is problematic.*

If educators decide themselves, others will cite overloads, and QP learners will not be attended to. The department must design a special compulsory programme to help QP learners. Learners fail even though they are offered extra lessons because of the limited time they are given. More time must be created for them to close the gap.

2.6. Sub-theme: Language of teaching and learning

The language of instruction plays an important role in the learners' achievements. The language used in class during the lesson is important as it makes the learner understand what is taught. The participants responded thus on this issue:

Participant 1: *There is a language barrier here. They have a problem, especially when it comes to understanding the sciences.*

Participant 3: *Learners have problems with language. We call it language barrier. It is very difficult for them to interpret questions so that they are able to give the correct answers. In Physical Science, if given a statement, learners just pick up those values without analysing it (the statement).*

Participant 5: *They have a language barrier. They fail to understand the questions. It makes them fail to get maximum marks.*

Proficiency in the language of teaching and learning is very important. The educator must be able to use this language clearly, so that learners might not struggle to

understand what is taught. Semeon (2014) revealed that learners face difficulties with meanings of everyday words when used in science context. Learners must be taught through the language of instruction so that they may not struggle to understand the questions. Further probing led to other participants revealing that they do not only use the language of instruction when teaching.

Participant 3: Sometimes I mix with vernacular because we have less gifted learners. If I use the medium of instruction throughout the lesson, to some of the learners it will be difficult. When it comes to most important points, I emphasise in vernacular.

Hlabane (2016) noted that learners' difficulties are related to proficiency in language of teaching and learning, conceptual understanding, questions that require explanations and higher order thinking skills, difficulties in comprehension and analysis of questions and mathematical skills. Learners who fail to understand questions might be due to the use of vernacular. If a learner has been taught in vernacular, it can be difficult for him/her to understand questions in English. Educators must learn to use the language of teaching and learning so that learners may not be confused when writing their final examinations.

THEME 3: THE STRATEGIES USED BY PHYSICAL SCIENCE EDUCATORS IN IMPROVING PHYSICAL SCIENCE GRADE 12 RESULTS.

3.1. Sub-theme: Feedback

Feedback on the activities of a learner is very important. It is a report on the performance, which can also be used to improve results. The participants observed the following.

Participant 1: Give them feedback. Individual consultation regarding feedback on the test given. Sometimes when giving them class work, I just tell them to give feedback on the board. When they write, when I correct them, they see on the board and this I find it helpful. Sometimes we use group work. They work in groups in order to help those who are not well.

Participant 4: *We give feedback. After marking, we make the corrections inside the classroom. We identify the challenges and we stick to those challenges.*

Participant 7: *Another thing is the issue of giving feedback to written activities. If we give them written work without feedback, it does not serve any purpose. Learners must see where they go wrong. Giving feedback for all written activities can improve results.*

There must be provision of feedback for every activity given to learners. Feedback gauges the effectiveness of the lesson presented. It helps to determine if learners understood the objectives of the lesson. If lesson presentation was ineffective, remedial work can be applied immediately. Sometimes individual feedback is important as it can directly help the learner to understand mistakes. Learners must be assisted so that they may understand issues well. Feedback can improve the Physical Science results because learners who are not knowledgeable and skilful are empowered through it.

3.2. Sub-theme: Motivation.

Motivation helps learners understand the importance of education. It drives learners to focus so that they can reach their dreams. The following are the participants' views on this.

Participant 2: *Learners must attend career exhibitions. Learners must take part in science competitions. They learn a lot of issues and at the same time get motivated.*

Participant 3: *For learners to improve in Physical Science, schools must invite motivational speakers to speak about matters concerning Physical Science and maths subjects. Schools must organise educational tours where learners can visit various places like universities so that they can get information about admission requirements which might make them work very hard.*

Participant 7: *We also have the issue of motivation. Learners do not perform well due to the lack of motivation. If we find someone who can motivate them, results may improve.*

Participant 8: *At our school, we started a programme where we interact with parents. We normally call parents to our school to interact on the importance of the Physical Science. We also invite people like doctors. This year, we invited pharmacists from a nearby hospital. They visited every class from Grade 10 to Grade 12. They spoke about their field of specialisation. It is one of the programmes that we started this year. We encourage other officials or people from other careers related to science to come and motivate our learners.*

When learners are motivated, they can understand that through hard work, nothing is impossible. Some learners need to be encouraged in order to realise that they can achieve their goals. Physical Science learners must be involved in science activities in order to develop the right attitude for their fields. If they take part in competitions, they can be motivated in studying harder. If people work in the science related fields, they are invited and can help learners understand that hard work pays. Learners can understand that it is possible to be what they want to be and must be assisted to realise their goals. They need people who can encourage them to focus on school issues. Others succeeded where it was difficult to make it and learners who feel they have no future can be uplifted.

3.3. Sub-theme: Outsourcing educators

Outsourcing in education is done when an educator is hired to assist the subject educator who might not be producing good results. The aim of outsourcing is to improve the results of the subject. Some participants said the following about outsourcing:

Participant 2: *Organise with neighbouring schools that offer Physical Science to form clusters where learners can be taught by different educators. A science educator cannot be competent in all topics. Forming clusters can help a lot because educators can work together.*

Participant 4: *We also have to outsource, especially if we feel we have some concepts we are not able to share information with learners. For my school to improve, I used to outsource from schools that perform better than ours.*

Participant 5: *We exchange programmes for teachers with neighbouring schools.*

Participant 6: *I try importing other educators from other schools or even from the other circuits in the district to come and assist us. I realise that when there is another educator, they pay attention more than when I am alone.*

Outsourcing is very important in underperforming schools. Makgakga (2014) noted that outsourcing has benefits towards improving the learners' academic achievements on topics that were taught. An outsourced educator must be used for topics that were taught at school, not at the beginning where nothing was done. It must be a revision lesson whose aim is to improve the learners' performance. Educators who are outsourced must be knowledgeable about the subject matter because the aim is to improve performance. The participants indicated that they form clusters to help learners. Some of their views are given below.

Participant 2: *Learners concentrate and can be motivated when taught by different educators. It also improves their self-confidence.*

Participant 3: *We organise cluster teaching. Teachers are not best in all topics.*

Participant 4: *All learners are sometimes combined to be addressed by examiners. I also look out for other experts to help teach Physical Science.*

Learners who are taught by different educators are likely to improve on their subject. Their different approaches on topics can lead to better understanding of the

concepts by others. It is of no help if an educator keeps on failing learners, yet does not seek for assistance elsewhere. It destroys the future generations. If teachers work together, it can be easy to improve Physical Science results. When educators help one another, it shows responsible because everybody has a section, which can be problematic. Learners are assisted in the best way, as a result.

3.4. Sub-theme: Extra classes

Extra classes are very important as they help learners who lag behind and need some concept clarity from activities done during lesson presentation. Three of the participants mentioned the following regarding extra lessons.

Participant 3: In order to improve the performance of Physical Science, we need to organise extra classes.

Participant 4: We play the video during morning and afternoon study or during weekends on Saturdays.

Participant 6: Planning of enrichment classes of which fortunately the department of education is playing a role. If there is an enrichment programme where learners meet at a particular place, it can help a lot.

If learners are given extra classes, they are likely to improve their performance. Another participant mentioned using videos during extra lessons to help the learners. It is very important that strategies different to those used in class be tried. Learners might perform badly due to their failure to understand the educators' approach. Different strategies help learners understand that there are many ways of teaching same concepts. If the same educator whom learners do not understand when teaching in class is in charge of extra lessons, the performance of learners might not improve.

Extra classes must be conducted with the view of improving the learners' performance. The planners of extra classes must ensure that they consider all aspects, which can improve results. It must not be for the sake of running a programme. Mokoena (2017) indicated that enrichment programmes fail because of

the exclusion of learners in planning, lack of diverse content activities in the programme, and the limited parents' involvement and roles in decision-making around the programme. The study further indicated that the monitoring team helps in instilling discipline among all stakeholders in the programme. Forming such a team assists in increasing parental participation in the programme. Enrichment programme is meant to assist learners on their performance. When such programmes are designed, they must be assessable. The learners' performance must be better than before the programmes were implemented. If no measurement tool was designed to measure the progress for the performance, it becomes useless. Learners must be involved in planning because the programme is designed for them.

3.5. Sub-theme: Monitoring

Any type of work not monitored is doomed to fail. Monitoring improves the quality of what is being done. The participants indicated the issue of motivation because it is an aspect which they may have noticed as not done thoroughly. The following are the participants' views:

Participant 4: Monitoring at school level is not done thoroughly. After two weeks, the SMT monitors written work and also moderate tests.

Participant 6: Work not monitored by SMT. The aspect of monitoring is lacking. We may be fortunate to be monitored by departmental officials once after a quarter or once a year.

Participant 7: We have the issue of monitoring written work. If the SMT can monitor written work, educators can be forced to do written work orderly knowing that it will be assessed or monitored.

The quality of monitoring of schools is viewed through learners' results. Some SMT members do not care about the progress of the school. They do not perform their duties, which, therefore, compromises the quality of education offered at their institutions. Educators do not work hard because no one cares at school. The SMT must ensure that teachers and learners' activities are monitored regularly. Rammala (2009) suggested that the school management team should ensure that educators

identify underperforming learners, monitor their utilisation of study time, and assist in resolving problems regarding their poor performance. If educators are monitored, they can go an extra mile in order to produce good results. In some schools where the participants teach, the SMT's role is not visible. They do not perform their leadership duties. Schools underperform because of their negligence.

3.6. Sub-theme: Assessment

In order to find out the effectiveness of teaching, learners must be assessed. The amount of work written by learners is directly proportional to their performance. The participants stated the following as strategies to improve results.

Participant 1: By giving learners more work. Treating of previous question papers by writing class work and tests. Giving learners short tests. Learners must always be engaged, sometimes by giving them open book tests. If learners are not engaged, you find them making noise instead of studying.

Participant 3: As a school, we need to develop a policy, which shows that learners must be given more written work. Learners must be given more informal tasks like class work, homework and tests.

Participant 4: Finish the syllabus on time. Learners must write more work.

Written work improves the learners' skills and knowledge. If learners write more work, they become familiar with what they can expect at the end of the year. Learners who are given lots of work are likely to perform better if it is controlled. Learners must be assessed regularly to familiarise them with the type of questions they can come across during examinations. However, some participants indicated that learners do not write activities they are given. Strategies must be developed to make learners write school work at home or at school.

THEME 4: CLASSROOM TEACHING PRACTICES.

The following results were obtained through observation method. Educators were observed once while teaching a Physical Science lesson in Grade 12. The observations were done at seven schools. It was difficult to observe the participants as they kept on postponing. They were not comfortable with such an arrangement.

4.1. Sub-theme: Classroom set up

All lessons were presented in a classroom furnished with desks; chairs and tables. All were orderly arranged as all classes had less than 30 learners. About three classes were not properly cleaned. Students' success in learning is determined by a positive learning and teaching environment (Sithole, 2017). A conducive environment cannot distract learners from their activities. They can concentrate on their educational matters. In some cases, Physical Science learners moved to unused classrooms for their Physical Science lessons. It usually occurred in schools with small numbers where learners are separated in certain subjects. The learners' movements from one class to another reduce contact time. It is in those situations where classes were not conducive for learning as classrooms were not tidy.

4.2. Sub-theme: Resources

Resources used were chalk, duster and green board in all lessons. There were no resources for demonstration or doing practicals. It was not a surprise to observe that in all lessons, no practicals were performed as participants indicated during interviews that there are no science resources at their schools.

Teaching without proper resources is a serious challenge to educators. The use of science centres and laboratory activities can help improve Physical Science performance (Danso, 2014). The few observed lessons showed that educators are also not able to use models where possible. Models require lots of time to make, and it should be understood that teachers do not do them as they are overloaded. Educators with enough free time must learn suitable ways of using models. Resources form the basis of proper preparation for a Physical Science lesson. Improvement in preparations can motivate learners to enjoy the lesson delivered.

4.3. Sub-theme: Educators' preparation

Educators must have a lesson plan while going to teach as it shows all activities to be performed by the educator while in class. Nesari (2014) defined a lesson plan as a written description of the education process; where materials, method, time and place of education as well as methods for evaluating the students are described in detail. Lesson preparation keeps a teacher focused on what must be done

Masekoameng (2010) noted that educators who are well prepared for their lessons have less discipline problems. Five participants had prepared for their lessons. They referred to them throughout the lesson presentation. Their presentations were in order. Three participants used text books only. There was no visible, prepared lesson. In some cases, educators struggle to know how to proceed with the lesson. In cases where educators had lessons prepared for, these were in order. Othmane (2015) indicated that lesson planning is the foundation of classroom management in that a good lesson preparation is a cornerstone for a well-managed classroom. A lesson presentation without a lesson plan is worthless. There is no need to teach without any aim or goal that must be achieved.

4.4. Sub-theme: Educators' content knowledge

Six educators showed control of the class and clearly knew the subject matter they were presenting. Selvaratnam (2011) indicated that successful implementation of the curriculum requires teachers who are competent in the cognitive (intellectual) skills and strategies needed for learning science effectively. One educator made mistakes during the presentation and was assisted by learners. From the observation, it was possible to make mistakes because the educator did not have a lesson plan, but used a text book to refer to during the presentation. Some educators are unable to use LTSM for teaching and learning adequately (Riet, 2015). Educators who struggle to understand the content cannot teach learners effectively. The findings correlate with what transpired during the interview sessions. During interview, other participants indicated that it is not easy for educators to know all content. When educators struggle, learners cannot be better performers. Participants had the following to say:

Participant 4: *There is nobody who knows all. Nobody who can say he/she knows everything. I make sure that I excel in those aspects I know. For aspects I do not know, I outsource so that learners may get everything they need.*

Participant 6: *I try importing other educators from other schools or even from the other circuits in the district to come and assist us.*

When a school does not produce the expected results, they ask for assistance from others. It is not good that learners fail because the educator is afraid to ask for assistance from those who do well. Educators cannot rely only on outsourcing. It is very important to empower educators so that they may be able to teach all the subject content. They must know the content so that learners can fully trust them. Educators who experience difficulties in teaching some topics cannot assess those properly. Learners would experience problems in answering such questions during examinations and this lowers their performance.

4.5. Sub-theme: Educators' teaching methods

In all presentations, participants used talk and chalk method coupled with an inquiry based (question and answer method) one. It is in correlation to what participants indicated that in their schools they lack resources. They use such methods because of lack of proper resources. The use of this method, coupled with experimentation or demonstrations, can be of great help to Physical Science learners. The lack of resources leads to educators using whatever method they think of. Zenda (2016) asserted that the lack of appropriate teaching methods is one of the main aspects that lead to high failure rate in Physical Science. In rural areas where educators lack sufficient resources, they use any possible method to explain their presentations.

From all the observations, there was no participant who used experimental, modelling or demonstration method during their lesson presentations. Their teaching methods were very important for learners to understand the lesson. Observations are in correlation with what other participants indicated during the interviews.

Participant 3: *I use various textbook methods. I use the lecturing methods at the end of the term when doing revision.*

Participant 6: *The approach does matter a lot. The same content can be explained in another way and it can end up improving the learners' understanding. They help a lot. If it was not for the money problem, I can keep on regularly requesting them to come and assist.*

Participant 7: *We use discussion methods whenever we deal with topics on which learners must give their views. We share ideas so that other learners who did not understand better may grasp something from those discussions.*

There are learners who fail because of the educators' approach. Learners understand educators differently, depending on how the lessons are presented. Improving on teaching approaches can improve performance in Physical Science. Danso (2014) noted that use of more learner-centred approach can significantly improve learner's performance in Physical Science. Learner centred approaches help learners to be actively involved. Learners gain a lot if they participate in presentations. They cannot forget easily something they were actively participating in. In rural areas where schools lack resources, teaching approaches like discussions, question and answer can be useful.

4.6. Sub-theme: Involvement of learners

In all the presentations, learners participated. They participated in large numbers where (inquiry) question and answer method was used. In most cases, educators asked the same learners and others remained as spectators. Teachers should provide learners with the opportunity to communicate in English during lesson presentations (Koran, 2015). If learners are given the chance to communicate during these, it can help them understand what educators teach. It can also help reduce their difficulties in understanding assessment. During lesson presentation, educators must always give learners an opportunity to ask questions because waiting to finish the lesson might cause learners to forget the aspects they thought of asking.

In all the lesson presentations, there was order in class. Learners were co-operative. They showed respect and participation during lesson presentations. Most of them were able to communicate with the educators because they were using question and answer method in most cases. Educators often communicate with the same learners because they adopt a system of raising hands. Those who are shy and cannot raise their hands can never be afforded a chance to be involved. Tesfaye and Berhanu (2014) revealed that some of the challenges that hinder learners not to participate actively in group discussions, presentations and demonstrations are poor academic background, shyness, and poor communication skills. Educators must learn to communicate with all learners equally. Treating all learners equally builds confidence in those who cannot express themselves freely.

During lesson presentations, all learners behaved well. Educators were able to control their classes effectively. The discipline they referred to indicates that it was related to studying and writing of school activities to be done in the absence of educators. Educators indicated that the learners' study habits are not proper. Learners do not regard education as an important issue. In the presence of a teacher during the lesson presentation, they were obedient, but it was not all who were taking notes on what the educators were teaching. Their relaxing mood indicated that they were not so concerned about what was taking place in the classroom. Learners must be encouraged to take education seriously, as it determines their future. They must know why studying is important in life.

4.7. Sub-theme: Language usage

All participants were able to use the language of teaching and learning. Two participants code-switched with the vernacular while teaching. Mokiwa (2013) noted that teachers do not always use English in the facilitation of learning in class. The use of different languages during lesson presentation leads to more problems in understanding assessment as there would be no translation. Hlabane (2016) noted that learners' difficulties are related to proficiency in the language of teaching and learning, conceptual understanding, questions that require explanations and higher order thinking skills, difficulties in comprehension and analysis of questions and mathematical skills. If learners are unable to understand most of the questions

because of the language barrier, they might lose interest in doing the subject. Failure to understand questions leads to poor performance.

Semeon (2014) also revealed that learners face difficulties with meanings of everyday words when used in a science context. Educators must improve their language of teaching and learning so that learners may not be affected by their problems in lesson presentations. If educators experience difficulties in presentation, it becomes worse for learners to understand it. Learners must be trained to understand the language of teaching and learning in order to improve language proficiency. Language proficiency can lead to improved Physical Science results because they can easily understand what they write about during assessment.

4.8. Sub-theme: Assessment

Assessment is an important part of the lesson as it measures the effectiveness of the presentation. After the presentation of a lesson, it is important to check if learners understood the subject matter. Assessment helps the educator to check the effectiveness of the lesson presentation. Pellegrino (2016) indicated that assessment must be to support classroom instruction and monitor science learning on a broader scale. Without assessment, it is difficult to know if the objective of teaching was achieved.

For most of the lesson presentations held, there was a lack of assessment. Only one participant was able to assess learners at the end of the presentation. The assessment was done through group activity. Group work cannot assess the individual strength, but they can be able to assist each other through discussions. All lesson presentations must be assessed if we have to improve performance in Physical Science. Educators do not bother to assess effectiveness of their lessons. As long as they have honoured their periods, they do not care about the teaching and learning outcomes. Rajoo (2012) stated that if the HOD sees his/her leadership role as primarily one of instructional leadership, educators will be given the necessary guidance and support to effectively teach the curriculum, and thus learners would perform well. Educators must be supported and guided in the correct implementation of the curriculum. Lesson preparation must always be adhered to if

teaching is to be seriously taken. It must not be a plan to please the SMT/HOD on how work is going to be done.

The presentations indicated that the SMT/HODs are only interested in educators honouring their lessons, instead of following their lesson preparations. Assessment tasks on lesson plan must be on the learners' activity books. Rustaman (2017) noted that there is a closer relationship between science instruction and science assessment. All lesson presentations must end with assessments to check their effectiveness. If lessons lack assessment, it is difficult to know whether they were successful or not. Learners must be familiar with the type of skills and knowledge required from lesson presented.

4.9. Sub-theme: Feedback

During the lesson presentation, the researcher observed that in most lessons, no feedback was given because they were not assessed. The lesson presentations were more of question and answer methods, and no activities were used to assess their effectiveness. Bacanli (2016) indicated that feedback or the information about the results means acquiring information about an action that has been carried out.

Feedback is intended to help learners progress from where they are to where they should be at the end of a period of work (Nayloret al., 2014). Lack of tasks given to learners shows the failure to test whether the presentation was successful or not. The importance of feedback was also mentioned by some participants during interviews. They indicated that feedback is an important strategy that can improve Grade 12 results, but when presenting their lessons, they did not assess or give feedback. It shows that educators know what must be done, but they are lazy to do it.

Learners must be given a lot of activities to do in order to verify if they understood the presentation correctly. It is unfair for learners to encounter a question for the first time in their examination. They must be familiar with all types of questions through feedback. Doing work correctly according to the curriculum statement minimises the failure rate. If the SMT or HOD carries out their responsibilities, such problems can be easily detected. It is the responsibility of the SMT/HOD to ensure that learners are

adequately taken care of. Some educators, if not monitored regularly, cannot do their work. Learners who are given feedback on activities done are likely to perform better than those who do not get it after assessment.

4.4. Conclusion

This chapter dealt with an empirical investigation. The research tools used to collect the data are included. For the interview findings, an interview schedule is attached. For data collected through observations, an observation schedule is attached. The interview schedule was used to obtain data on factors affecting the learners' performance, challenges facing Grade 12 Physical Science educators in improving results and strategies used by educators. The observation schedule was administered in obtaining data from teachers' practices. The last Chapter discusses the summary of the findings in detail, including the summary of the whole study. A set of recommendations is provided as well.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1. INTRODUCTION

The previous chapter dealt with an empirical investigation. This chapter discusses the study findings. This is done thematically. The findings of the study have been discussed in relation to the views of the cited authors in the literature review. Also provided in this chapter are the study's delimitation, contribution to knowledge, recommendations and overview of the study. Last, a conclusion is drawn to close the study.

5.2. THE FINDINGS OF THE STUDY

5.2.1. Findings based on interviews

Eight participants took part in interviews. The findings of these are based on the following sub sections.

5.2.1.1. The challenges facing Physical Science Grade 12 educators in rural schools

The findings on Physical Science educators' challenges are as follows:

Physical Science educators in rural areas experience different challenges that limit them from producing quality results. Most schools in rural areas have no resources that can promote teaching of Physical Science. The lack of resources at schools compromise the way in which Physical Science is taught. A study by Legotlo et al. (2002) also cited the lack of resources as a major cause of poor performance in Grade 12. A resource centre was built where learners' skills and knowledge of Physical Science must be promoted, but it is not effective because of the large numbers of learners visiting the place at once. All Physical Science FET (Grade 10 to 12) learners are supposed to visit the centre to do experiments if their schools have no resources. Lessons offered at the resource centre are through demonstrations. Learners only acquire knowledge of how certain aspects must be carried out than skills for doing experiments.

The curriculum of the country changes because learners produced must be competent enough to take their place in the world order. A change in curriculum affects educators because some contents and approach change. When the curriculum changes, educators are not thoroughly trained. They are given a few days for training, and they cannot master all the changes they have to implement. Lack of knowledge delays proper teaching processes. The finding is supported by Kriek and Grayson's(2009) study, which noted that poor performance in Physical Science is due to limited content knowledge and ineffective teaching approaches. Physical Science educators do not get sufficient support from SMTs. The performance of Physical Science learners in rural schools does not improve because schools fail to buy science educators the basic apparatus they are supposed to use. SMTs also fail to monitor the educators' activities.

Leadership in schools which are in rural areas want learners to choose subjects as they wish. Though the enrolment of learners might be small, they choose to have most of the streams. Most of the educators' workload is high because their schools are small and have many different streams. If educators' workload is high, their effectiveness is reduced. A study by Zenda (2016) also cited high workload as one of the factors that lead to a high failure rate.

5.2.1.2. Factors affecting the performance of Grade 12 Physical Science learners in rural areas.

Most parents in rural areas are not involved in their children's education. They can only assist their children financially. Children must be supervised so that they may not lose focus on their education. Cruz (2016) also indicated that parental involvement in education is one of the key contributing factors to students' academic success. In some cases, children are on their own at home because parents work in other provinces. Parents and educators must work together to assist learners to cope with their studies. Most learners do not write activities assigned to them as homework because no one supervises them.

A study by Dhurumraj (2013) acknowledged that most learners come from underprivileged homes and thus receive little support from their parents. They only study if there are tests to be written. The behaviour of learners leads to poor

performance in Physical Science. Learners must practice every day if they are to perform well in Physical Science. Poor performance by learners discourages others from studying Physical Science. The Department of Basic Education has introduced a policy that allows learners to fail only once in a band. Learners who pass based on these policy face difficulties in passing the next Grade because of the gap which occurred when they were promoted. They are not given special attention to bridge the gap caused by subjects they failed the previous years. It becomes the responsibility of the subject teacher to decide what to do with learners to close that gap.

Educators do not always use the language of teaching and learning while presenting their lesson plans. They mix *patois* with the language of teaching and learning. Mixing of languages makes learners fail to understand key concepts in their study. Some learners fail to answer questions because they do not understand what has been asked. Improper use of teaching language reduces the performance of learners in Physical Science. Hlabane (2016) also noted that learners' difficulties are related to proficiency in the language of teaching and learning, conceptual understanding, questions that require explanations and higher order thinking skills, difficulties in comprehension and analysis of questions and mathematical skills.

5.2.1.3. The strategies used by Physical Science educators to improve Grade 12 Physical Science results

It was indicated that feedback is very important to be given in each activity done by educators at school. If learners are given feedback, they are likely to improve in their studies. Feedback is an essential element of improving the learners' learning processes (Al-Bashir, Kabir & Rahman, 2016). Feedback must be offered individually for those who have a specific challenge in their study. Learners must be motivated to improve their performance in Physical Science. The following are said to be some of the strategies to improve Physical Science performance:

- Learners must attend career exhibitions;
- Get motivational speakers who work in the science related fields; and
- Involve learners in science competitions.

For schools to improve results, they must outsource educators who perform well. Educators cannot work in isolation if results are to be improved. It is very important to acknowledge that there are other educators with good strategies in assisting learners. Learners must be given extra classes so that they may have time to focus on their education. Affording learners extra classes can help with more revisions, which can lead to better performance in Physical Science. SMTs must monitor the learners and educators' work regularly. Educators must attend their classes and assist learners accordingly. The amount of activities given to learners must be related to the periods that the educator teaches them. The quality of work must be according to what is expected in the examination guidelines. Learners' exercise and test books must also be checked so that their performance may not be a surprise when examinations are written. Learners must be given more written work for Physical Science results to improve. If learners are assessed regularly, they can be familiar with what they are expected to do. Pellegrino (2016) stated that assessments must be to support classroom instruction and monitor science learning on a broader scale. Learners must be given more informal tasks.

5.2.2. Findings based on observations

5.2.2.1. Classroom teaching practices

The following findings on classroom teaching practices were obtained through the observation of lesson presentations. Many schools in Vuwani do not have resources that can be used to teach Physical Science. Educators mostly use the talk and chalk method, coupled with the inquiry based approach because of the lack of resources. For experiments to be performed as required by the CAPS document, they visit a science resource centre.

Even though most educators showed their preparations during the lesson presentations, there were others who still rely on text books only. The use of text books only can create problems if the CAPS document is not consulted. Some of the aspects required to be done might not be in the textbook. The majority of educators were in control of their class and showed their understanding of the content they presented. There are educators who mix vernacular and the language of teaching and learning while teaching. Mixing of languages is due to lack of words that an educator can use while teaching. Semeon (2014) revealed that learners face

difficulties with meanings of everyday words when used in the science context. From all lesson presentations observed, learners were co-operative and showed disciplined. Educators did not assess the effectiveness of their lessons after the presentations. A study by Gopal and Stears (2007) indicated that strategies that assess more written work are required if we wish to gain a better understanding of the learning that occurs in science classroom, as lack of assessment leads to poor performance.

5.3. DELIMITATIONS OF THE STUDY

The study had limitations that have been followed. Limitations are matters and occurrences that arise in a study, which are out of the researchers' control (Simon & Goes, 2013). The research was done in a rural area, in Vuwani's rural schools in the Vhembe District, in the Limpopo Province.

5.4. CONTRIBUTION TO KNOWLEDGE

The study would likely add knowledge on issues pertaining to the production of learners who excel in Physical Science subjects. Learners' improved performance in Physical Science in rural areas would nurture parents' confidence in their children's schools. This has the potential to reduce the number of learners enrolled in urban schools from rural areas.

5.5. RECOMMENDATIONS.

5.5.1. Recommendations relating to the study

The study recommends that there must be a partnership between schools, communities and business sectors. Businesses must assist schools that are in rural areas. The partnership could help improve the infrastructure and the resource shortage in rural schools. Government alone cannot be able to improve the challenges experienced in rural areas at a faster pace. The private sector must adopt schools in rural areas in order to assist them where possible. If government and businesses work together in improving the quality of education in rural areas, the shortage of skills could be addressed.

- SMT must reduce streams in small schools to lessen workloads on educators.
- SMT must monitor the educators' activities.
- When the curriculum changes, the DBE must ensure that educators are thoroughly trained. It is embarrassing for an educator to struggle with the content and approaches in front of learners.
- Parents must be assisted on how to help their children focus on their studies. If educators assist parents in finding better ways to monitor their children at home while studying, results can improve. Most of the parents in rural areas are illiterate. Some of them do not know how to assist their children.
- DBE and schools must motivate learners on the importance of education.
- In order to improve the results, the effectiveness of each strategy implemented in improving results must be assessed. This would assist the leadership of the school to choose strategies that can be best for the institution.
- The DBE must regularly hold workshops to help educators who struggle with content. The focus must be on poor performing schools, as schools cannot outsource every year. Educators must be empowered through content workshops.
- Educators must be thoroughly prepared when teaching learners. They must show confidence and understanding on the subject matter. An educator must know all the activities done in class before teaching.
- Physical Science educators must adhere to the language of teaching and learning.
- All lesson presentations must be assessed to gauge their effectiveness.
- SMTs must buy science equipment in order to improve the teaching conditions of physical in rural schools.
- The DBE must assist rural schools by supplying them with the Physical Science equipment.

5.5.2.Recommendation for further studies.

- A study focusing on the comparison between poor performing Physical Science schools and those performing well is essential. Schools can be in the

same environment, but performing differently. It is important to study their practices so that poor performing schools may be properly assisted.

- A study on the effectiveness of SMTs at schools is necessary. The quality of SMT members is gauged by the performance of the school. The study must look at whether they are trained or not and also if they are aware of their duties and responsibilities.
- A study on the roles of subject advisors at schools should be done.

5.6. OVERVIEW OF THE STUDY

The first chapter served as an introduction, and the manner in which the research was conducted was outlined. The aim of the study was to explore practices and challenges facing Physical Science educators in improving Grade 12 results in the Vuwani rural schools.

Chapter two provided a detailed literature review. The focus was on what other scholars say about the phenomenon under study. Their views and observations helped situate this study in the context of what has been studied so far. In this chapter, the theoretical framework and Department of Basic Education policy regarding issues of rural schools were discussed.

In chapter three, the study focused on methodology and its inherent research design. The study is qualitative and adopted an interpretivist paradigm. Outlined here are the study's population, sampling and sample size, data collection techniques and ethical consideration. The data was collected through interviews of Physical Science educators and observing them during lesson presentations.

The fourth chapter analysed data collected during fieldwork. The research tools used to collect data are included. For the interview findings, an interview schedule is attached. For the data collected through observations, an observation schedule is attached as well. The interview schedule was used to obtain data on factors affecting learners' performance, challenges facing Grade 12 Physical Science educators in improving results and strategies used by educators. The observation schedule was administered in obtaining data from teachers' practices.

The last chapter discussed the study findings thematically. Also provided in this chapter are the study's recommendations based on the study's findings. Last, a conclusion is drawn to close the study.

5.7. CONCLUSIONS

The teaching of Physical Science in rural schools is challenging since these do not have resources to assist them make science meaningful to learners. Lack of resources at schools' limit educators' proper teaching of Physical Science. Parents are also not supportive of their children's education. Most educators' lesson presentations lack assessments. Educators must assess learners in line with the examination guidelines if we are to improve the Physical Science results. In order to prove that the lesson was successful, it can be noticed through the performance after the assessment. Assessment helps to check if there is need for intervention strategies to assist low performers. The DBE must prioritise the assistance of schools in rural areas in order to develop our country. Schools must be supplied with science equipment so that learners may develop the love for the subjects. If schools in rural areas are neglected, people in such areas would not be educated and this becomes a burden to the country.

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APPENDIX A

INTERVIEW SCHEDULE FOR EDUCATORS:

TOPIC: Practices and challenges facing Physical Science educators of Vuwani rural schools in improving Grade 12 results

SECTION 1

INFORMATION ABOUT THE EDUCATOR

Fill in the correct information in the spaces provided below.

GENDER: (tick in the correct space)

Male	<input type="checkbox"/>
Female	<input type="checkbox"/>

AGE GROUP: (tick in the correct space)

21-30 years	<input type="checkbox"/>
31-40 years	<input type="checkbox"/>
41-50 years	<input type="checkbox"/>
51 and above	<input type="checkbox"/>

NUMBER OF YEARS TEACHING PHYSICAL SCIENCE IN GRADE 12

HIGHEST ACADEMIC QUALIFICATION

SECTION 2

INTERVIEW QUESTIONS

1. What are the challenges that you encounter as an educator in improving Grade 12 Physical Science results?
2. What are the factors affecting the performance of learners in Physical Science in Grade 12?
3. What are the strategies that can be used to improve the results of Physical Science Grade 12 learners?

APPENDIX B
OBSERVATION SHEET

1. Information about the school

Grade:	
Number of learners:	
Male:	Female:

2. Classroom set up

3. Resources (Using Physical Science teaching and learning support materials)

YES	<input type="checkbox"/>
NO	<input type="checkbox"/>

4. Educator's preparation. (Availability)

YES	<input type="checkbox"/>
NO	<input type="checkbox"/>

5. Educator's content knowledge

6. Educator's teaching methods

7. Involvement of learners

8. Language usage

9. Assessment

YES	
NO	

10. Feedback given

YES	
NO	

APPENDIX C

ENQ: BALOYI M.S
CELL: 0733058888
EMAIL: bmiringo@gmail.com0944

P.O Box 325
Masia

13 August 2017

THE DISTRICT SENIOR MANAGER
Limpopo Department of Education (Vhembe District)
Private Bag x 2250
Sibasa
0970

Dear Sir/Madam

REQUEST TO COLLECT DATA FOR RESEARCH

1. I am presently attached to the School of Education at the University Of Zululand working on a thesis titled **“THE CHALLENGES FACING PHYSICAL SCIENCEGRADE 12 EDUCATORS IN IMPROVING RESULTS”**.

1. I would like your permission to conduct my research in schools in Vhembe District at Vuwani area.
2. Physical Science teachers and subject advisors from secondary schools under Vuwani area will be required to participate in data collection processes.

4. I wish to inform you that there will be no risk involved in the research and that special care will be taken to ensure that there is no any form of disruption in the day-to-day running of participating schools. I shall conduct myself with great professionalism throughout the data collection process.

5. These are my particulars:

Baloyi M.S

Institution: University of Zululand

Student no: 201759997

Thanking you in anticipation.

Regards

Baloyi M S (Mr)

APPENDIX D

UNIVERSITY OF ZULULAND RESEARCH ETHICS COMMITTEE (UZREC) ETHICAL CLEARANCE APPLICATION FORM (2017)

ANNEXTURE D: PARTICIPANT INFORMED CONSENT DECLARATION INFORMED CONSENT DECLARATION

(Participant)

PROJECT TITLE: Practices and Challenges facing Physical Science educators of Vuwani rural schools in improving Grade 12 results.

Baloyi Miringo Samson from the Department of Social Sciences, University of Zululand has requested my permission to participate in the above mentioned research project. The nature and purpose of the research project, and of this informed consent declaration have been explained to me in a language that I understand.

I am aware that:

1. The purpose of the research project is to determine the practices and challenges facing Physical Science educators in improving Grade 12 results in Vuwani rural schools in Limpopo province.
2. The University of Zululand has given ethical clearance to this research project and I have seen/may request to see the clearance certificate.
3. By participating in this research project, I will be contributing towards provide valuable insights into thinking that will inform the development of a strong sense of number and the role of problems in teaching mathematics in primary schools; this will help the reader to more effectively interpret the curriculum while being useful for teachers in their teaching and learning situations.
4. I will participate in the project by answering questions during a one-to one interview.
5. My participation is entirely voluntary, and should I at any stage wish to withdraw from participating further, I may do so without any negative consequences.

6. I will not be compensated for participating in the research, but my out-of-pocket expenses will be reimbursed.

7. There may be risks associated with my participation in the project. I am aware that:

A. the following risks are associated with my participation: physical discomfort, humiliation and emotional stress.

B. the following steps have been taken to prevent the risks: the participants will be assured of their anonymity and in this regard, researcher will assure participants that their names or identities will not be disclosed. Confidentiality will also be assured by protecting all data gathered and by not making data available to outsiders. Data will be stored in a locked cabinet and destroyed after completion of analysis. Electronic data will be stored on a computer requiring password access. The researcher will ensure that participation in this research will not cause any physical discomfort, humiliation and emotional stress.

C. there is a 0% chance of risk materialising.

8. The researcher intends publishing the research results in the form of a dissertation and journal articles. However, confidentiality and anonymity of records will be maintained and my name and identity will not be revealed to anyone who has not been involved in the conduct of research.

9. I will not receive feedback/will receive feedback in the form of transcripts regarding the results obtained during the study.

10. Any further questions that I might have concerning the research or my participation will be answered by: Baloyi Miringo Samson.

11. By signing this informed consent declaration, I am not waiving any legal claim, rights or remedies.

12. A copy of this informed consent declaration will be given to me, and the original will be kept on record.

I,have read the above information/confirm that the above information has been explained to me in a language that I understand, and I am aware of this document's contents. I have asked all questions that I wished to ask, and these have been answered to my satisfaction. I fully understand what is expected of me during the research.

I have not been pressured in any way and voluntarily agreed to participate in the above-mentioned project.

Participant's signature

Date.....

APPENDIX E



LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

VHEMBE DISTRICT

CONFIDENTIAL

DEPARTMENT OF EDUCATION
VHEMBE DISTRICT
2017-08-28
PRIVATE BAG X 2250 SIBASA 0970 TEL: 015 962 1313/4 FAX: 015 962 6039
LIMPOPO PROVINCE

REF: 14/7/R
ENG: MATIBE M.S
TEL: 015 962 1029

MR BALOYI M.S
UNIVERSITY OF ZULULAND
KWADLANGEZWA CAMPUS
PRIVATE BAG X 1001
KWADLANGEZWA
3886

PERMISSION TO CONDUCT RESEARCH AT SCHOOLS

1. The above matter refers.
2. You are hereby informed that your request for permission to conduct research on **"The challenges facing physical sciences grade 12 educators in improving results"** has been granted.
3. You are expected to adhere to research ethical considerations, particularly those relating to confidentiality, anonymity and informed consent of your research subjects.
4. Kindly inform circuit managers and School Principals of selected schools prior to commencing your data collection.
5. Wishing you the best in your study.


DISTRICT DIRECTOR

2017-08-28
DATE

PERMISSION TO CONDUCT RESEARCH AT SCHOOLS: BALOYI M.S

Thohoyandou Government Building, Old Parliament, Block D, Private Bag X2250, SIBASA, 0970
Tel: (015) 962 1313 or (015) 962 1331, Fax: (015) 962 6039 or (015) 962 2288

The heartland of southern Africa

APPENDIX F

**UNIVERSITY OF ZULULAND
RESEARCH ETHICS COMMITTEE**
(Reg No: UZREC 171110-030)



RESEARCH & INNOVATION

Website: <http://www.unizulu.ac.za>
Private Bag X1001
KwaDlangezwa 3886
Tel: 035 902 6731
Fax: 035 902 6222
Email: DlaminiA@unizulu.ac.za

ETHICAL CLEARANCE CERTIFICATE

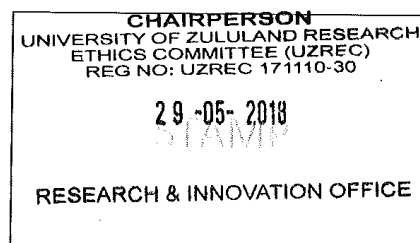
Certificate Number	UZREC 171110-030 PGD 2018/219					
Project Title	PRACTICES AND CHALLENGES FACING PHYSICAL SCIENCE EDUCATORS OF VUWANI RURAL SCHOOLS IN IMPROVING GRADE 12 RESULTS					
Principal Researcher/ Investigator	MS Baloyi					
Supervisor and Co- supervisor	Dr BT Gamede					
Department	Human and Social Sciences					
Faculty	Education					
Type of Risk	Med Risk- Data collection from people					
Nature of Project	Honours/4 th Year	Master's	Doctoral	x	Departmental	

The University of Zululand's Research Ethics Committee (UZREC) hereby gives ethical approval in respect of the undertakings contained in the above-mentioned project. The Researcher may therefore commence with data collection as from the date of this Certificate, using the certificate number indicated above.

- Special conditions:
- (1) This certificate is valid for 3 years from the date of issue.
 - (2) Principal researcher must provide an annual report to the UZREC in the prescribed format [due date-29 May 2019]
 - (3) Principal researcher must submit a report at the end of project in respect of ethical compliance.
 - (4) The UZREC must be informed immediately of any material change in the conditions or undertakings mentioned in the documents that were presented to the meeting.

The UZREC wishes the researcher well in conducting research.


Professor Gideon De Wet
Chairperson: University Research Ethics Committee
Deputy Vice-Chancellor: Research & Innovation
28 May 2018



APPENDIX G

24 January, 2019.

To whom it may concern,

This is to confirm that I did proofread and edit MR. BALOYI MIRINGO SAMSON's PhD Thesis whose title is: ***PRACTICES AND CHALLENGES FACING PHYSICAL SCIENCE EDUCATORS IN THE VUWANI RURAL SCHOOL IN IMPROVING GRADE 12 RESULTS.***

His thesis read fairly well, but it needed two weeks of proper editing and fixing its coherence. Errors attended to included but were not limited to concordance, sentence construction, some repetitions, as well as discourse markers. After attending to these errors, Mr. Baloyi's document now reads better.

Should you require any clarification, my contact details follow below:

Cell: 0784803023 or 0607589535

Email: 68ngwenya@gmail.com
Or: ngwenyachris@webmail.co.za

Sincerely,

Ngwenya Christopher (PhD).