EDUCATORS' AND LEARNERS' VIEWS ON FACTORS THAT CONTRIBUTE TO POOR PERFORMANCE OF GRADE 12 PHYSICAL SCIENCE LEARNERS IN THE UMKHANYAKUDE DISTRICT IN KWAZULU NATAL

by

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Signature.....

DECLARATION

I, YANGA MAJAMANA hereby declare that this dissertation, entitled *Educators' and learners' views about factors that contribute to poor performance of Grade 12 Physical Science in the UMkhanyakude district***,** is my own original work and has never been submitted to any University for the award of any degree. All the sources used have been acknowledged in the form of references.

CANDIDATE'S SIGNATURE.....

SUPERVISOR'S SIGNATURE.....

CO-SUPERVISOR'S SIGNATURE.....

DEDICATION

This dissertation is dedicated to my entire family, for their patience, love, support, motivation and encouragement that they offered me during the time I was carrying out this study.

I would like to dedicate this dissertation to our dear beloved grandmother Nowina Majamana, for giving us the best education without having enough money.

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ABSTRACT

Physical Sciences continue to be one of the subjects that yield poor results in Grade 12 every year. Many factors have been said to contribute to the poor Grade 12 results including resources and teaching methods. This study however, investigated the educators' and learners' views on factors that contribute to poor performance in Grade 12 from a rural UMkhanyakude district of KwaZulu Natal. A questionnaire with both closed and open-ended questions was used to determine learners' views, while an interview schedule was used to delve into the educators' views.

Frequency results from learner questionnaires revealed that learners viewed issues such as overcrowded classrooms, lack of parental support, lack of support from education local office, lack of resources, and a negative attitude towards Physical Science as the main factors that contribute to poor performance in Grade 12 Physical Sciences. The inductive analysis of the teachers' interview transcripts revealed that teachers believed that giving extra support without resources such as well-resourced laboratories, and parental support is sometimes impossible. These key findings can contribute to programmes that seek to strengthen the teaching of Sciences in rural contexts; thus this study makes a contribution to what is known about the factors that contribute to poor performance in Grade 12 in a rural context.

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LIST OF ABBREVIATIONS

SMT- School Management Team

RBT-Resource –Based Theory

SMK- Subject Matter knowledge

DoBE- Department of Basic Education

UNESCO- United Nations Educational Scientific and Cultural Organisation

FET- Further Education and Training

SBA-School Based Assessment

ZPD- Zone of proximal development

CHAPTER 1: INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

The high rate of underachievement in Science at high school level is a cause for great concern across the globe (Fonseca & Conboy, 2006:82). As a result, some nations, including the United States and Zanzibar, for example, urge all citizens, with special emphasis on schools, parents, industry, government and science communities, to make a concerted effort towards the improvement of performance in science subjects to ensure that future results are more encouraging (Roach, 2005:1; Yussuf, 2007:1). It is disturbing to note that corresponding trends of low achievement in Science have also been recorded in South Africa (Howe, 2003:1-15; Makgato, 2007:90-93; Govender, 2009:3). Moreover, Ngema (2016:1) emphasises that the Ingwavuma Circuit, located in the UMkhanyakude District, the Northern region of the KwaZulu-Natal province continues to perform poorly, especially in science subjects.

The striking and most central feature emerging from all these nations, indicate that underachievement in Science at high school level continues to be a major global challenge (Aldous, 2004:65-70; Fonseca & Conboy, 2006:82-83; Kanyongo, Schreiber & Brown, 2007:37-43). It is therefore, imperative to address this challenge for sustainable development, as each country's wealth and economic development is directly related to the capacity of its scientific workforce (Muwanga-Zake, 2008:1-2).

Although there are substantial global efforts to increase and improve scientific literacy and the scientific workforce (Muwanga-Zake, 2008:1), it has, however, been recently realised that the science education systems are churning out fewer Science graduates at all levels than the global economy requires (Cameron, 2009:15-16; Einhorn, 2008:2). It may therefore, be logical to argue that the aforementioned decline in Science graduates reflects a world-wide inability to succeed in Science at secondary school level (Fonseca & Conboy, 2006:82). Presumably, this as a result, could be a reason which has led to skill shortages in science-related fields, particularly in developing countries of the African continent (Madibeng, 2006:1-2).

The most common problem linked to learners' poor performance in Science in most developed countries has been identified to be a shortage of qualified Science educators (Ruby, 2006:1007), which is directly linked to poor performance in high school. Naturally, poor high school science graduates lead to few university or college enrolments by prospective science teachers (Howe, 2003:4-5; Ruby 2006:1008-1009). With the above projections, it becomes difficult for schools to have enough teachers to teach science subjects (Hill, 2014).

Most developing countries including South Africa have a host of other factors ranging from lack of adequate Science resources, and facilities such as apparatus and laboratories, large Science classes, limited proficiency in the medium of instruction to outdated teaching methods as the central contributors to poor performance in science subjects (Howe, 2003:1-2; Makgato, 2007:90; Mji & Makgato, 2006:259-261; Muwanga-Zake, 2008:4-6). Even with suggestions to use teaching methods which are flexible, creative, and more learner-centred to accommodate different learning styles of learners, poor performance still prevails in science subjects (Al Maghraby & Alshami, 2013).

In South Africa, the mounting toll of failure in Science persists to be a major concern at matriculation level especially in historically disadvantaged townships and rural public schools (Cameron, 2009:16; Bloch, 2008:2; Gopal & Stears, 2007:16). Subsequently, it may then imply that the underlying reasons for underachievement of learners in Science at matriculation level, particularly in historically disadvantaged public high schools of South Africa, have not yet been sufficiently researched or appropriately treated. Therefore, this study aimed to explore educators' and learners' views on factors that contribute to poor performance of learners in Grade 12 Physical Science in the UMkhanyakude district, to contribute to what is known within this global challenge of poor performance in Science subjects.

1.2 PROBLEM STATEMENT

The poor performance in Physical Sciences of Grade 12 learners has been a source of concern to a number of stakeholders including teachers, parents, learners and Department of Education officials. The UMkhanyakude district is no exception to the poor performance in Physical Sciences. A number of studies (Mji & Makgato, 2006:264; Madibeng, 2006:1; Muwanga-Zake, 2008:4-6) that looked at the causes of poor performance in Physical Sciences have attributed poor performance to a number of factors including: inadequate communication ability of learners and educators in the language of instruction; larger classes; lack of qualified Physical Sciences educators; poor teaching methods; inadequate knowledge; poor time management; and lack of material resources.

According to the Department of Basic Education report (DBE, 2014:66-76); in the years 2012-2014 the UMkhanyakude district experienced poor performance in Grade 12 Physical Sciences. Between the years 2010 and 2011 the district obtained a consistent 44% pass rate. The year 2012 on the other hand, showed an improvement of 9% which increased the general Physical Sciences pass rate to 53, 4%. In 2013 there was improvement by 11% from 2012 results; this improved the general pass rate to 64,02%. The 2014 results showed a decline by 8% in pass rate. Between the year 2010 and 2014 the matric results in UMkhanyakude district for Physical Sciences were not consistent and the improvement that occurred was insignificant.

Having considered the many studies (Mji & Makgato, 2006:265; Madibeng, 2006:2; Muwanga-Zake, 2008:5-6) that looked at academic performance in Physical Sciences in Grade 12 in South African schools, little research has been conducted among teachers and learners of the UMkhanyakude district (a rural district) to gain information on their perspectives on what the causes of the poor performance in Physical Sciences are; hence the need to conduct this study.

1.3 PURPOSE OF THE STUDY

This study aimed to explore educators' and learners' views about factors that contribute to poor performance in Grade 12 Physical Science in UMkhanyakude District of KwaZulu Natal.

1.4 RESEARCH QUESTIONS

The following questions which emanated from the formulation of the problem were:

- What are the learners' views on factors that contribute towards poor performance in Grade 12 Physical Science?
- What are the educators' views on factors that contribute towards poor performance in Grade 12 Physical Science?

1.5 OBJECTIVES OF THE STUDY

The objectives to be accomplished through this study were to:

- determine learners' views on factors that contributes towards poor performance in grade 12 Physical Science; and
- determine educators' views on factors that contributes towards poor performance in grade 12 Physical Science.

1.6 SIGNIFICANCE OF THE STUDY

Conducting this study explored why learners in the rural schools of UMkhanyakude district are not performing well in Physical Science. The study provides insight into the problems and solutions that might help inform specific actions to be taken to effectively address the poor performance of these learners in Physical Sciences. The findings of this study have potential to assist the Department of Basic Education and School Management Teams to improve the level of performance. As Howe (2003:2) puts it, "countries need suitable quality teachers, doctors, scientists and many other scientifically oriented professionals." This suggests that this study is important and may benefit the community and the country as a whole.

1.7 DEFINITIONS OF OPERATIONAL CONCEPTS

1.7.1 Poor performance

Poor performance refers to learners obtaining marks below 30% in the National Senior Certificate Examination, and thereby failing the subject (Department of Education, 2003:9).

1.7.2 Physical Science

According to the Department of Education (2003), Physical Science focuses on investigating physical and chemical phenomena through scientific inquiry. By applying scientific models, theories and laws Physical Science seeks to explain and predict events in our physical environment (Department of Education, 2003:9).

1.7.3 Grade 12 learners

Grade 12 learners are learners in their final year of study at high school level. At this stage learners are prepared for transition to college or university, after passing written public examinations (Jackson, 2004).

1.7.4 Curriculum

Curriculum as a field of study is crucial to the health of schools and society; it can be defined narrowly as a subject that is taught in school or it can be defined broadly as experiences that people require in order to be actively involved in society (Ornstein & Hunkins, 2009:1).

1.7.5 Teaching strategy

A teaching strategy is a broader plan of action for teaching and learning activities with a view to achieve learning outcomes which provide an outline of achievement and approaches teachers use when facilitating learning and teaching activities (Jacobs, Vakalisa & Gawe, 2004:175).

1.8 DISSERTATION OUTLINE

Chapter 1

This chapter is about the orientation of the study. This chapter orientates the reader about the problem researched. It comprises of the introduction of the study, motivation for the study, problem statement of the study, aims and objectives of the study, research questions as well as the organisation of the dissertation.

Chapter 2

This chapter outlines literature review which covers the theoretical background of the study.

Chapter 3

Chapter 3 details the research design and methodology of the study. It includes the procedures for data collection, the selection of the participants, a plan for organising and analysis of data.

Chapter 4

A detailed analysis and interpretation of data are discussed in this chapter. This chapter presents the main findings of the study.

Chapter 5

In this chapter, a summary, conclusions and recommendations based on study findings are outlined, and suggestions for future research are made.

1.9 CHAPTER SUMMARY

This chapter presented the orientation to the study, with a special focus on the performance in Science as a subject in developing countries. It also outlined the research problem, the purpose of the study and the research objectives achieved. The significance of this study was pointed out. The chapter further outlined the definition of operational concepts used throughout the study. The next chapter presents the theoretical framework underpinning the study, as well as the literature review.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

In this chapter, the teaching and performance of learners in Physical Science Education is considered in terms of prior scholarship. Rudestam and Newton (2015) emphasise the need for new researchers to show respect for earlier research, to connect new work to the wider debate, and to advance knowledge by making an insightful critique that will help peers to view the world differently by moving knowledge in their field of study further. In the discussion that follows, an attempt is made to critically examine the teaching and the performance of learners in Physical Science as explained by various authors and to highlight the inadequacies that are inherent in the current trend. Moreover, it is imperative to realise the need for a paradigm shift in examining the performance of Physical Science learners in South Africa. The Resource Based Theory has been advanced to explain factors influencing the performance of Physical Science Grade 12 learners, together with teachers' views on the factors that contribute towards poor performance in Grade 12 Physical Science. Literature on the strategies that can be implemented by stakeholders to improve the performance of the learners in learning of Physical Science by Grade 12 learners in South Africa, is also reviewed.

2.2 THEORETICAL FRAMEWORK (RESOURCE-BASED VIEW)

The Resource-Based Theory (RBT) was first coined to understand performance in terms of capacity and opportunity due to resources (Conner & Prahalad, 1996). Powell and Dent-Micallef (1997) note that the evolution of time has made the RBT become a widely acceptable research viewpoint, constructing the relationship between resources and performance. The restructuring and integration of the resources generate the resource uniqueness that can improve responses to the requirements of the changing surrounding environment (Baker, Sciarra & Farrie 2014) and in addition they increase the chance for better performance (Baker, 2016). It is therefore, evident that the RBT is appropriately suited, and best explains the

relationship between learner performance and provision of resources in Physical Science which were the primary objectives of this study.

The RBT was applied in this study to present the idea of instruction and learning as a system of interactions. In the interaction, students interact with other students, students interact with their teacher, the teacher interacts with content (resources), and students interact with the content as well (resources). With the help of this model, this study conceptualised resources as more than just physical aspects, but as systems of objects, relationships, actors, and environments. These resources therefore, were not limited to reading materials, but rather the physical and human resources.

The main tenets of the resource-based view are that education facilities possess different resources, the differences are enduring, and these differences lead to variations in performance (Baker et al., 2014). In this view, resources are the basic and crucial determinants of performance. This implies that resources in the teaching and learning of Physical Science are more than just physical, but they are systems of objects, relationships, actors, and environments or school.

Killen (2013) notes that it is important for teachers to place learners at the centre of teaching endeavours, and to create an environment conducive to help them construct their knowledge rather than just absorb it. Furthermore, Cohen (2002) emphasises that instruction, is not something done by a teacher to their students, but rather a process in which knowledge is collectively and collaboratively built through and with classroom resources. It is therefore, imperative that the human resources, which teachers are equipped with should incorporate knowledge on how to discharge the correct content to Physical Science learners and as a result this would impact on improved learner performance. Figure 2.1 illustrates the tenets of the Resource-Based Theory and how it affects the teaching and learning of Physical Science. It is important to note that the word content in this study is understood to generally mean the resources.

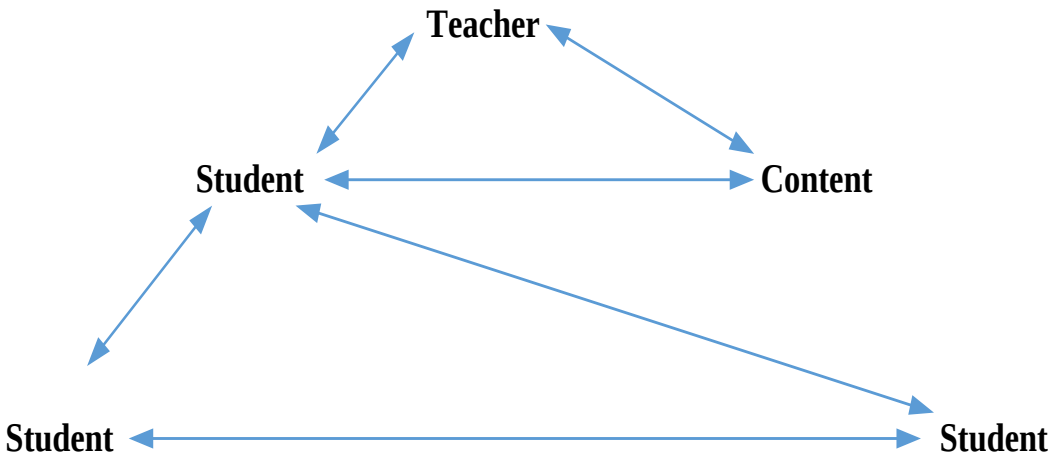


Figure 2.1: Resource-Based Theory/View (Source: Cohen, Raudenbush & Ball 2002)

The RBT therefore, serves as theoretical lens for the purpose of this study, in exploring educators' and learners' views on factors that contribute to poor performance of Grade 12 Physical Science learners, with the emphasis on provision and accessibility to resources. Utilising Resource-Based theory, the researcher identified the physical and human resources that have a bearing on the learning of Grade 12 Physical Science. According to Killen (2013) an assessment of the physical and human resources is of importance, because resources provide strength and support which necessitate the process of learning, even though the RBT focuses on the availability and use of resources and is a determinant for success in any learning context; performance in Physical Science in South Africa can be understood in different ways. Below are some of the sub themes that focus on what is known in academic performance in Physical Sciences, and even navigate the terrain in this particular discipline knowledge base.

2.3 ACADEMIC PERFORMANCE IN PHYSICAL SCIENCE IN SOUTH AFRICA

There is a realisation by researchers that learner performance in Physical Science has remained poor over a long period of time. Statistics on the performance of Physical Science are not satisfactory especially if one is to assess the number of

those registered for the subject versus those who succeed (Khumalo, 2013). The graph below reflects the above observation:

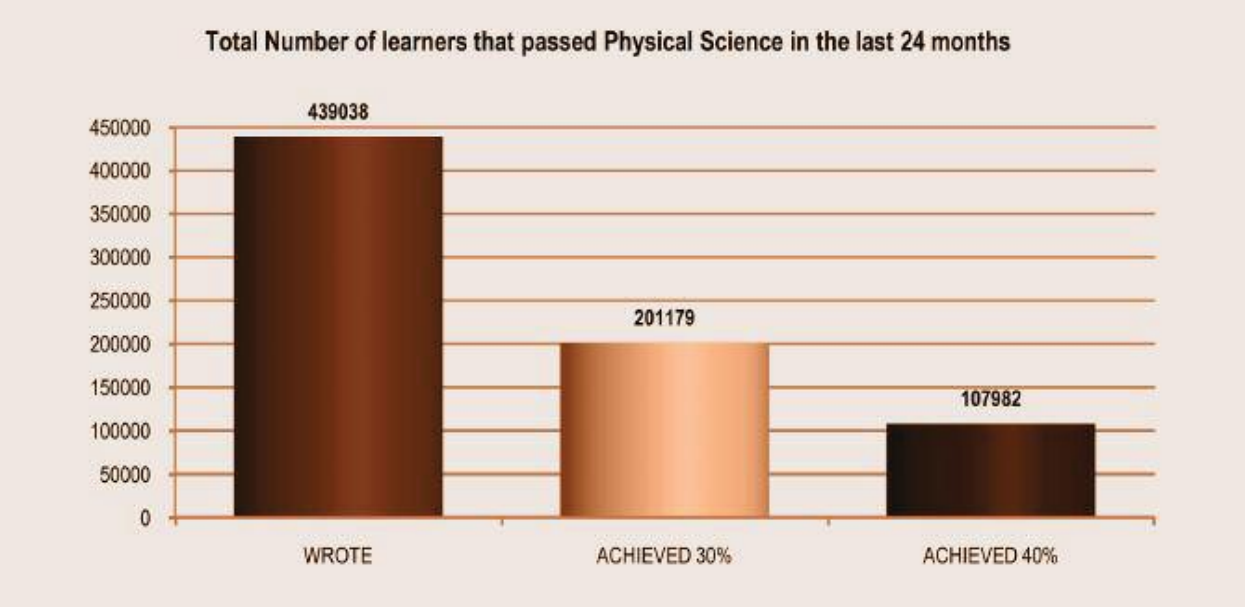


Figure 2.2: Source: National Examinations and Assessment Report 2009

The above graph reveals the number of learners who wrote Physical Science had increased by 2009 in South Africa. The number of learners who achieved a pass in Physical Science was 201179 and 107982 achieved the NSC at 40%. These learners adhered to the requirements for admission to Higher Education. The graph also reveals that the performance of learners in 2009 is lower than the performance of learners in 2008. This indicates that the performance has deteriorated instead of improved.

There is sufficient evidence to support the dismal performance of learners taking Science and statistics in literature attests to the fact that there is poor performance in Physical Science in South Africa. The Department of Basic Education's report of 2013 recorded that the pass rate of learners who passed Physical Science in Physical Education dropped to an alarming 53%. It was clear that South African learners are not performing well in Science as a subject. Although the South African government is trying to provide quality education for all learners, the performance of learners in the science subjects is disappointing.

2.4 FACTORS CONTRIBUTING TO POOR PERFORMANCE IN THE LEARNING OF PHYSICAL SCIENCE

2.4.1 Financial factors

James, Naidoo and Benson (2008) indicate that there is a direct correlation between a nation's wealth and its scientific and technological capacity. The financial status of the nation will affect the level of motivation of the educators and the ability of the country to provide all the needed resources in the teaching and learning of Physical Science. The above notion is in line with the theoretical framework underpinning this study. The RBT emphasises that the availability of resources is pivotal in determining performance. Makgato and Mji (2006) assert that motivation of teachers through better remuneration is indeed a factor in determining the performance of students. They conducted a qualitative study to find out factors associated with high school learners' poor performance, putting a spotlight on Mathematics and Physical Science in District 3 of Tshwane North. They found that motivation and interest are key factors which has a bearing on performance. Furthermore, Modisaotsile (2012:4) indicated that South Africa continues to face numerous challenges when it comes to Physical Science teachers, the first being that Science teachers are leaving the education sector every year because of the low salaries, poor infrastructure, resources, and excessive workload. The issue of resources is also a challenge amongst learners and families, particularly from rural areas. A study conducted by Ngema (2016:68) indicates that learners do not have resources to enhance their learning at home, therefore, they are unable to improve their knowledge except when they are at school. This may lead to a loss of interest in their school work and poor performance (Mwenda, Gitaari, Nyaga, Muthaa & Reche, 2013:98).

This study was therefore, necessary as it explored educators' and learners' views about factors that contribute to poor performance in Grade 12 Physical Science in UMkhanyakude District of KwaZulu Natal.

2.4.2 Human resources

South Africa is in need for scientifically and technologically qualified individuals who are passionate about science and technology and who are able to use their skills to advance the country's economy (James et al., 2008). This realisation therefore, makes it clear that there is need for an improved human resources base to improve learner performance. Educators, as key human resources, become a critical determinant in learner performance in the teaching and learning of Physical Science. Reports from qualitative research on the teaching and learning of science from World Science Forum (2007) purports that the current situation in South Africa is aggravated by several challenges. These include many under-qualified and unqualified teachers, low teaching standards, outdated teaching practices and under-resourced classrooms. A major problem in South Africa identified is a lack of subject matter knowledge (SMK) of some teachers (Rogan & Grayson, 2003). Moreover, Rogan and Grayson (2003:18) also state that over 60% of Science teachers working in schools have no formal training in the teaching Science. They also have limited knowledge of Science. However, the Department of Basic Education (DoBE) expects those teachers of Physical Science to implement the curriculum in schools. These hindrances have caused many challenges over the years. In addition, Taylor and Booth (2015) states that about 67% of the teaching force in Physical Science are not fully equipped, let alone qualified to teach Physical Science. One of the findings revealed that educators struggle to teach Physical Science practically, because some of the teachers could not operate certain apparatus available in the schools, and thus, they avoided them and left them in the storeroom. Therefore, there is a need to provide training for teachers to increase their skills in using apparatus during experiments to improve learner performance.

The teacher is part and parcel of the teaching and learning process in any educational system. As contained in the National Policy on Education in South Africa (2004), the teacher is one of the key factors in the actualisation of the goals of teaching in schools. Orlando (2013) stipulates that a good teacher is also a skilled leader. This suggests that teachers have a crucial role to play in the effective teaching and learning of Science in the secondary schools. A good teacher creates a sense of community and belonging in the classroom and provides supportive,

collaborative environment for learning (ibid). Some techniques for assuring success is to state the goal for the lesson, provide simple and clear explanations, request the learners to express their comments, ask questions and provide hands-on activities as often as possible, and incorporate assessment tasks that are flexible to improve learner performance. Learners should acquire knowledge, think about it, remember it and apply it when solving problems and in so doing, this could possibly improve their results. Thus the teacher should assist learners to learn Science better and more effectively use appropriate methods. Furthermore, appropriate teaching methods contribute to learning through generating and refining ideas, organising and integrating work, sustaining group spirit, and managing learning (Lieberman, 2004:83). As a teaching method, collaboration allows learners to actively participate in learning by talking to each other and listening to others' point of view. Group discussions establish a personal connection between learners and the topic of study and it helps learners to think in a less personally biased way (Lieberman, 2004:83). A learner's new capacities can only be developed in the Zone of Proximal Development (ZPD) through using appropriate teaching methods in Physical Science, in actual, concrete, situated activities with an adult or more capable peer. With enough assisted practice, the child internalises the strategy and completes the task (Greenfield, 2004:246). Hence, the ways that a teacher utilises to deliver Physical Science Education lessons impact on the achievement of learners in Physical Science.

Lieberman (2004:89) states that learning by teaching is also a teaching method. Therefore, there is a need to create opportunities for learners with skills and knowledge to teach their peers. Learners who teach others must study and understand the topic well enough to teach it to their peers. By having learners participate in the teaching process, they gain confidence and strengthen their speaking and communication skills in Physical Science. Therefore, effective group discussions can result in the improvement of learner's performance in Physical Science. Furthermore, Lui (2012) emphasises that teachers are able to engage learners in social interactions for effective learning to take place.

The teaching method cannot be effectively implemented in Physical Science without involving the school management teams. The school principals and heads of the

Department must also supervise the curriculum coverage content for Physical Science. The Department of Basic Education (2012a) conducted research about the implementation of Maths, Science and Technology. The findings of the research revealed that many educators do not complete the syllabus in Physical Science in Grade 12, because educators spend more time on teaching chapters that are supposed to be taught in Grade 10.

Several studies on the performance of Physical Science learners have demonstrated that regardless of the actions being taken at systems level, real quality improvement depends on what is happening in the classroom. Schools are the delivery points of curriculum at which all the input of the system comes together for interaction and determines the quality of the teaching-learning process. It is in the classroom that most of the basic problems with quality (teacher-learner absenteeism, use of human and material resources, poor teaching practices) can be monitored properly. When teachers feel that control and support efforts all converge on the improvement of their professional development, they are more liable and readily accept assistance (UNESCO, 2007:7-8). The main objective is to improve quality of delivery and results (UNESCO, 2007:7-8). Therefore, supervision could have an impact on learner achievement in Physical Science.

The education system is guided by the rules and policy implemented by the DoBE. Rules refer to formal or informal regulations that can in varying degrees, constrain or liberate the activity and provide the learner guidance on correct procedures. The teacher-learner ratio is a policy or regulation that comes from the DoBE and schools are required to implement the policy. The policy can constrain or hinder learner achievement. The teacher-learner ratio is guided by set rules in schools and contradictions and conflicts arise that can affect learner's academic performance. The achievement of Physical Science learners thus needs to be viewed through the policy environment in South Africa.

Mwamwenda (2004:222-229) argues that if classes are large and crowded, it is difficult for the teachers to control. Undesirable behaviour on the part of the learners in such classes may well be the result of them being uncomfortable and therefore, unable to concentrate. Misbehaviour in this context may be a way of releasing

tension. Learners may also experience discomfort, because of poor ventilation or extremes of temperatures in classrooms. Furthermore, Nakanyala (2015: 78) also emphasises that overcrowded classrooms were one of the factors affecting the use of effective teaching methods in teaching the grade 12 Physical Science. He further mentioned that in some secondary schools learners did not even fit in the laboratory to conduct the practical work, because one class, for example, had over 50 learners.

There is a direct relationship between the teaching of English as a subject and the teaching of other subjects that use English. The National Council of Teachers of English (2012:1) recommends that schools, districts, and states adopt plans and implement activities resulting in class size that allow effective teaching and learning to take place. This Council maintains that "effective learning demands opportunities for learners to become actively involved in their education, and demands many roles of their teacher as facilitator, as enabler, as empowered not only as lecturer and transmitter of knowledge" (National Council of Teachers of English, 2012:1). Furthermore, the National Council of Teachers adds that these opportunities and roles cannot be achieved when teachers are faced with large classes and heavy duty workloads and most importantly when the teachers are not proficient in the use of English as a language of command in their Physical Science teaching practice.

However, statistical analysis of results in KwaZulu Natal has shown that the teacher-learner ratio has been decreased to an average class size of 39:1, but this is not the case in many rural schools (Department of Basic Education, 2009:9). Shortage of sufficient human resources would then negatively impact on learner performance.

Phurutse (2005:5) argues that literature fails to stipulate the optimal class size. The belief though is that the quality of teaching, interaction with learners, the learning process, satisfaction and active learner participation will decline as the size of the class increases. According to a report of Department of Basic Education (2009), teaching large classes of 50 or more learners in public schools is one of the many long-standing concerns facing the education system in South Africa. In large classes the teacher is unable to focus on individual differences (Yelkpieri, Namale, Esia-Dankoh & Ofosu-Dwamena, 2012:327). This means that the section in the CAPs document that requires inclusivity and indigenous knowledge cannot be adhered to,

and this can disadvantage slow learners and minimise the chance for learners to associate Physical Science with their individual cultures. Physical Science educators, who teach smaller classes, display more positive attitudes to learners and their work and consequently improve learner academic achievement compared to those who teach larger Physical Science classes (Phurutse, 2005; DoE, 2009:8-9).

Learners in smaller classes show more appreciation for one another and a greater desire to participate in classroom activities. In smaller classes, more learning activities can take place fostering greater interaction among learners. This increases their desire to assist each other. Smaller classes allow for potential disciplinary problems to be identified and resolved faster and improve teacher morale and reduce stress. Research evidence reveals class size reduction will result in fewer learner dropouts (Howie, 2003; Phurutse, 2005:6; DoE, 2009:8-9).

According to Gopal and Sterns (2007:16) large classes are characterised by insufficient learner interaction and rapport, lack of individual attention from the teacher and inability to ensure adequate provision of learning experiences such as handling of apparatus, observations and recording of results by each learner during experiments. Phurutse (2005:5) states that large classes negatively influence what the educator does with learners and what learners do during teaching and learning of Physical Science. Also, the improvement of performance in Physical Sciences involves many stakeholders.

2.4.3 Parental and community involvement

Parental involvement is an important factor in the school achievement of learners. Muijs and Reynolds (2001:103) assert that “one of the main things that parents can do to help their children complete their homework is to provide a quiet and private space where the child can do his/her homework." They further point out that "this does not necessarily mean that parents should make sure that children turn the radio off or don't listen to music" (Muijs & Reynolds, 2001:103). To the contrary, according to Hallan and Cowan (1999), listening to music can aid concentration. This will probably differ from child to child and children should be allowed to listen to music

while studying or completing homework if they feel comfortable doing so (Muijs & Reynolds, 2001:103).

The improvement of matric results in Physical Science involves all the stakeholders at large and parents are not an exception. According to the Education Laws Amendments Act, No 50 of 2002 (Department of Basic Education, 2012b:1) the performance of learners is in terms of law the responsibility of all in education; the focus of the circular was on the need to improve achievement by learners in South Africa. This includes the need for parents, teachers, principals and learners to participate in education. Barber and Kelly (2004: 95) state that it is necessary to create the virtuous circle where public education delivers results, encourages confidence and therefore, is willing to invest, and consequently, the system can improve further. Parents together with teachers and learners, form a formidable team tasked with promoting the best interests of the school and enabling it to strive towards the provision of quality education for all learners. Parents should encourage their children to complete their homework and should support their children when they ask for help without doing the homework for them (Hallam, 2004). Even though the parental involvement maybe viewed differently by different individuals but in this research the definition by Modisaotsile (2012:3) is used, which defines it as an activity where the parents are fully supportive of their children's education, not only in assisting with homework, but also in motivating their children to participate in extramural activities, guiding them in respect of social interactions around others and ensuring that their children are at school on time and at their best behaviour. Parents' effectiveness impacts to a great extent on the successful operation and performance of the school (DoE, 2009:18).

Research conducted by Dhurumraj (2013) investigated the contributory factors to poor learner performance in Physical Science in KwaZulu-Natal Province with special reference to schools in the Pinetown District. In this study, Dhurumraj (2013) concluded that there was need to improve social interactions through including parental involvement, which can result in positive learner academic performance.

Parents play a role in reviewing and contributing to homework given to their children and have the capacity to meet their learning expectations. Parental involvement

encourages and improves basic learning and teaching, resulting in excellent outcomes (Khumalo, 2014). Furthermore, parents nurture learners' talents and guide them to reach their potential and encourage and ensure that learners study at home and assist them with their school work. The parents play a key role in dealing with problems such as learners' discipline to facilitate effective teaching and learning at school and in classrooms (Ibid). When parents participate in their children's school work, they develop and improve the learning of children. Communication between teachers and the parents is very important, as it can influence parental involvement in the teaching and learning process (Sax, Harper & Wolf, 2012:138).

Sax, et al.,(2012: 138) report that all parents exert an influence on their children's learning. This is supported by Dhurumraj (2013:62) who elaborates further by saying that those parents working together with teachers by simply taking an interest in their children's work, there is a greater chance of improving Physical Science performance. All teachers should realise the need for parental support, just like parents realise the role of the school in their community. When parents and teachers are not clear of their respective roles, the encouragement and activation of parents' involvement may create a strain between them, resulting in division and conflicting interests. However, Mwamwenda (2004:222) has another view when he states that parents themselves may foster misbehaviour of their children. In addition, they interfere in what the teacher is doing and refuse to allow their children to be punished, irrespective of what they have done. Some parents criticise the teacher in front of their children telling them, what may and may not be done to them. In the same vein, the role of parental involvement in education has received greater interest over the years. A learner whose parents often visit the school is likely to behave well as the learner becomes aware that their parents often communicate with the teachers. The parents should be aware of any activities that take place at school, and parent-teacher conferences of meetings where the child's performance is the focus of attention, are important (Campbell & Vema, 2007:503).

Moreover, Dhurumraj (2013) states that parental involvement is about ways in which parents can participate in their children's education. Parents are part of the learning community. Through attending school meetings, open days and prize-giving ceremonies, parents can view their children's work and discuss progress with

teachers. The DoBE (2013:2) states that parents should be well informed about what happens in the school, and receive regular reports about how well their children perform against clear standards that are shared by all schools. Parents know that if something is not happening as it should in the school, they must be obliged to take further steps to deal with the problems.

According to UNESCO (2007:15) parental involvement in teaching and learning enhances teacher accountability. The accountability relationship between parents and teachers involves three components, namely: consensus on objectives; exchange concerning methods, and discussions about the results obtained. The implication being that, parents should work together with teachers to create a learning and teaching environment that is conducive to the achievement of quality learning at school. Parents should work collaboratively with teachers and learners to turn schools into a thriving centre of excellence more especially in Physical Science. The influence of the parents determines that kind of product that arises from the teacher, instructional materials and school environment (DoBE, 2012a:7).

Therefore, parents should provide input with the purpose of improving the quality of teaching and learning. There is a need for parents to provide basic resources such as electricity, and computers at home to facilitate studying and subsequently improve learner performance. Parents monitor curriculum coverage, written work (formal and informal assessment), and attendance including lesson attendance by both teachers and learners. Parents should engage, comment and make recommendations based on the performance (DoBE, 2013:13). In this regard the parental involvement could have an impact on learners' performance in Physical Science.

In addition to family involvement in the learners' education, after school programmes or classes have also been found to contribute to academic success (Mouza Marzocchi, Pan & Pollock, 2016). Mouza at al., (2016) examined how equitable pedagogical practices can be applied in the design of computing programmes and the ways in which participation in such programmes influence middle school students' learning of computer science concepts, computational practices, and attitudes toward computing. They found that the after-school programmes positively

influenced student learning of computer science concepts and attitudes toward computing.

2.4.4 Teacher effectiveness

Reynolds (2007:14) states that teacher effectiveness has been found to strongly influence learner progress. The United Nations Educational Scientific and Cultural Organisation (UNESCO), (2007:15) describes an effective teacher as one where the average achievement of the learner is higher than the expected, given the background of the learners and the context in which they are living. Therefore, research indicates that for the effective teaching and learning of Physical Science adequate and relevant resources need to be available, as they make up an essential component (Dhurumraj, 2013:49). Teachers are needed to guide learners in critical stages of the learning process so that they can be effective thinkers. According to the DoBE (2012a:3) effective teachers carry out supervision of learners during group and individual activities. Teachers provide counselling and career path guidance to learners and expose learners to the environment outside the school through attending expos and career exhibitions in Physical Science as the way of motivating them so that they can be engaged in science activities.

Effective teachers set realistic goals even if the school is under-resourced and provide opportunities for learner success that may otherwise have resulted in consistent failure in Physical Science. This is achieved by restructuring the learning environment that accommodates all the learners' ability. According to Joubert and Prinsloo (2009:174) teachers have a variety of duties that include on-going assessment of learners to ensure that they meet the required standards, formulating teaching outcomes, understanding disciplinary codes of conduct and maintaining discipline. Teachers maintain order in the school and classrooms to protect the learners and regular consultations with learner's parents (Ibid). Furthermore, they emphasise that effective teachers encourage learners and provide quick and constructive feedback during the teaching and learning process (Joubert & Prinsloo, 2009:174). Hence, effective teachers contribute to improved achievement by learners.

Lemmer and Ronald (2006:52) stress that Physical Science learners are placed in a difficult situation as they are exposed to three different subjects simultaneously: Physical Science, Mathematics and English. Therefore, Physical Science educators should create educational environments that allow learners to develop and understand the language that is used as medium of instruction in the most effective and beneficial ways possible. According to the DoBe (2011:14) it is important to provide learners with opportunities to develop and improve their language skills in the context of learning Physical Science. Therefore, it will be critical to afford learners opportunities to read scientific texts, to write reports, paragraphs and short essays as the part of their assessment. Moreover, Morrison (2009:122) states that effective teachers need to guide and support learners in understanding how to solve problems that involve calculations through integration of Physical Science and Mathematics. Learners are provided with the opportunity to explore scientific facts, concepts and principles and often specialised scientific skills to collect and analyse scientific information during teaching and learning of Physical Science (DoBE, 2011:142).

Motshana (2004:21) conducted a survey of teachers in Mpumalanga Province, and concluded that teacher effectiveness depends on a positive school climate. Therefore, Physical Science educators should plan carefully with each learner in mind and provide activities that capture learners' diverse interests as well as create a classroom environment to accommodate all learning modalities including experiments (Trowbridge, Bybee & Powell, 2004). An effective teacher implements all the forms of the curriculum and has higher positive expectations from the learners and uses a variety of teaching strategies, such as co-operative activities, group involvement, pair activities and peer assessment. Effective teachers focus on learner performance, high grades, and competition and encourage learners to set performance goals (Woolfolk, 2010:442). Consequently, effective teachers implement the Physical Science curriculum daily by including homework, class work, test and experiments given to learners in each topic. However Nakanyala (2015:90) found that the Grade 12 Physical Science teachers in some schools rarely marked their learners' work in the exercise books, while some teachers in some schools did not even return the exercise books to their learners after a certain class activity or homework.

It appears that for quality of Physical Science teaching in schools to improve, there are several issues that need to be addressed, including the provision of resources at the schools and the creation of a teaching and learning environment that encompasses teachers' 'pedagogical content knowledge in the classrooms (Mji & Makgato, 2006). According to Garcia (2003) the teacher's inadequate background in science, insufficient facilities and equipment and a teacher's negative attitudes about science are possible obstacles to the effective teaching of science in the classroom setting. Teachers' poor background of science knowledge contributes to teachers hesitating to teach Science with the right teaching approaches, and this could cause an inability to deliver the Science content effectively to learners.

2.4.5 Material resources

Howie (2003:20) and Shumba (1999: 55-72) identify the lack of material resources, poor teaching methods inefficient supportive systems and environments within the school as major contributory factors that affect learner academic achievement in science subjects. Furthermore, the World Bank (2008:04) states that learning and teaching materials are critical ingredients in learning and the intended curriculum cannot be easily implemented without them. The DoBE (2012c) notes that the issue of insufficient resources occurs at national as well as provincial level. The staff members are not issued with personal computers or laptops and, in short, there is insufficient technological tools earmarked for the facilitation of this endeavour (improving Physical Science grades among learners). The adoption of computers and laptops in teaching Physical Science is necessary as this allows learners to explore some concepts related to Physical Science. Computers allow learners to connect themselves via internet and this will in turn assist them to share and learn more scientific ideas. Hence the availability of computers and laptops impact on learner achievement.

However, the United Nations Scientific and Cultural Organisation (UNESCO, 2007:21) deduces that the influence of a specific input or process factor on results is never direct or linear, and an increase in the number of textbooks per learner, for example, may not directly lead to an improvement of examination results. According

to UNESCO (2007:21), it was found that individual schools that have similar material and teaching-learning conditions had very different results. Despite the deplorable conditions in some schools, learners do relatively well, while in other schools the results are not good even though the required resources are available.

In addition, Legotlo, Maaga and Sebego (2002:115) state that learners' textbook ratio of 10:1 was recorded in most South African schools as another factor that contributes to poor performance of learners. However, Muwanga-Zakes (2008) found that some educators make false claims that they do not teach Physical Science practically due to shortage of apparatus. Although the above finding attributes towards poor performance by learners due to a shortage of apparatus, the perceptions by educators indicate that they are somewhat responsible for the failure of their Physical Science learners. The perception of teachers is therefore, key in designing strategies to improve learner achievement.

According to Bernhard (2003:313-321) tools, conceptual and physical artefacts play an important role in human thinking and learning yet technology is frequently missing, or insufficiently used in Physical Science. Although not guaranteed, Bubenzer (2008:3) mentions that an increase in resource availability could be an answer for improving results in Physical Science. This possibility is also supported by Lewin and Stuart (2003:44) who maintain that the impact of the textbooks is the greatest in the poorest countries where teacher quality may be low and where facilities and resources are scarce and generally of a poor quality. The methods and strategies employed by teachers contribute to the performance of learners. Vhurumuku (2010) states that other factors play a role in the underperformance of learners in schools such as strategies that science teachers use to teach Physical Science. For a science learner to engage in observation as a science skill, a learner needs to see a practical situation which illustrates the lesson. The strategy of teaching Physical Science cannot be using a textbook only. Demonstration of lessons and chemical reactions should be an integral part of the teaching and learning process in a Physical Science classroom. Testing of ideas is not confined to pen and paper, but rather an active involvement of learners in investigative lessons (Vhurumuku, 2010:99-111). The availability of instructional materials and aids could have an impact on learner performance in Physical Science.

2.4.6 Infrastructural resources

In South Africa, one undeniable fact is that the education system has always been set by infrastructural shortages and problems (Khumalo, 2014). To its credit, the DoBE in South Africa focuses on increasing the pace of infrastructure delivery, improving infrastructure planning capacity and financial management, and developing human resource capacity in schools. This may be seen from the perspective that the post-apartheid South African government has initiated policies aimed at improving the educational performance of both the educators and learners (Ibid). Infrastructure is an integral component of the learning and teaching context. This is because a school's infrastructure enables students and teachers to access a wide range of tools, services and resources to support learning and teaching. For instance information technology through the use of computers could be useful for teaching, learning and administrative purposes. However, lack of electricity for instance renders the virtues of information technology useless in such a context. The lack of resources is a critical factor in education, because it may negatively affect the learning and teaching processes within the classroom. It is reported on the one hand, that a lack of facilities and under-resourced schools are directly associated with the academic failure of learners (Lolwana, 2004).

Most key resources in Physical Science is the lack, or availability of a science laboratory in a school. Veloso and Marques (2017) conducted a study to explore how changes in the design of learning environments, particularly science laboratories can impact on a school in a Portugal context. The sample size within this study was from 30 schools where renovations on the laboratories were completed. Using both quantitative and qualitative methodologies, they analysed laboratory design documents, interviewed architects involved in the designing of the laboratories, made site visits to the labs, and collected feedback from the teachers and learners. The learner feedback indicated that learners were happy with the renovations done; while teachers expressed concerns. Teachers were unhappy about the features which were removed from the older model of the laboratories which included electrical sockets and water taps on each table. The newly renovated laboratory design focused on creating a flexible space; but had to affix water taps and electrical sockets on the walls (away from tables). Teachers expressed that the new design

made it hard to do practical experiments with learners, and to assess the learners' ability to conduct the experiments. They also expressed their unhappiness with the separate storage space from the lab tables as it is too far away and wastes time for experimentation. This finding clearly shows that teachers should be allowed to dictate to architects about how teaching spaces should be designed, and that the design impacts on instruction, and eventually on learner success.

2.5 THE CURRICULUM ASSESSMENT POLICY STATEMENT (CAPS)

The Physical Science curriculum is the part of the activity system, since it is goal-oriented. The goal is set to have an intended outcome. According to the DoBE (2011:8), Physical Science investigates physical and chemical phenomena and this is done through scientific inquiry, application of scientific models, theories and laws to explain and predict events in the physical environment. Furthermore, the DoBE, (2011:8) states that this subject also deals with society's needs to understand how the physical environment works to benefit from it and responsibly care for it (outcome). All scientific and technological knowledge, including indigenous knowledge systems, are used to address challenges facing society. Teaching and learning should be more like playing which includes 'work' simultaneously, meaning that the learning will have an immediate application, function, and real-world use (Wilhem, Baker & Dube, 2001:8).

Zumdahl (2008:4) refers to Physical Science as a subject that is all about wondering. Questions are asked about why things are the way they are, how they are related to another, and what processes happen to cause the changes that people see around them. He states that good scientists are not the people who have answers, but people who keep asking questions. Scientists make ideas that must pass a strict test. Physical Science knowledge helps scientists to predict things that are going to happen. In Physical Science, the learner should develop curiosity about natural phenomena, and can solve problems in scientific, technological and environmental contexts. This is the major element that needs to be instilled in learners of Physical Science along the CAPS lines. In addition, Physical Science knowledge must be linked to plans to test predictions or hypotheses where learners should contribute to systemic data collection, with regards to accuracy, reliability and controlling

variables. Learners need to evaluate data and communicate findings, to find patterns and trends in the data collection and to generalise in terms of simple principles.

The DoBE (2011:8) also states that “the purpose of Physical Science is to make learners aware of their environment and to equip the learners with investigating skills relating to physical and chemical phenomena, for example, lightning and solubility”. Examples of some of the skills that are relevant to Physical Science are classifying, communicating, measuring, designing and investigating, drawing and evaluating conclusions, formulating models, hypothesising, identifying and controlling variables, and inferring, observing and comparing, interpreting, predicting, problem-solving and reflective skills. The learners work with the problem as they undertake systematic enquiry and the group is guided by the teacher. The problem-solving approach allows learners to develop relevant content knowledge and the meta-cognitive skills that will enable them to become good learners and problem-solvers (Harland, 2002: 263-273).

Physical Science promotes knowledge and skills in scientific inquiry and problem-solving, the construction and application of scientific and technology knowledge. According to the DoBE (2011:8), Physical Science should prepare learners for future learning, specialist learning, employment, socio-economic development and environmental management. The CAPS outlines several practical activities for formal and informal assessment that must be integrated with theory to strengthen the concepts being taught in Grades 10-12.

According to the DoBE (2011:143), assessment is a process that measures an individual learners’ attainment of knowledge (content, concepts and skills) in Physical Science by collecting, analysing and interpreting the data and information obtained to enable the teacher to make reliable judgments about a learner’s progress, inform learners about their strengths, weaknesses and progress and assist teachers, parents and other stakeholders in making decisions about the learning process and the learners’ progress. The assessment guideline stipulates the number of activities to be given to learners in Physical Science to improve learner performance is the strictest part of the education curriculum mandate.

Furthermore, assessment is viewed as a vehicle for driving Physical Science teaching and learning, since successful implementation of the curriculum mostly depends on it (Beets & Le Grange, 2005:190). The rules that direct how the assessment should be conducted are received from the DoBE in the form of policy in Physical Science CAPS document. The DoBE (2011:143) states that assessment is a continuous planned process of identifying, gathering and interpreting information about the performance of learners using various forms of assessment. However, assessment should be both informal and formal. Informal assessment is a daily monitoring of learners' progress (DoBE, 2011:143).

This is done through homework, class-work, group assignments and experiments. Informal assessment should be used to structure the acquisition of knowledge and skills and should be a precursor to formal tasks in the programme of assessment. The DoBE emphasises that informal assessments should be used to provide feedback to the learners and to inform teacher planning. Teachers and learners can mark these informal assessment tasks. Both self-assessment and peer assessment are important as they actively involve learners to learn from and reflect on their own performance. It encourages learners to take responsibility for their own improvement, and is the route to excellence in Physical Science. Learners should be motivated by a desire to succeed, to explore, to develop and to improve, not by fear of failure (DoBE, 2011:142).

Formative assessment tasks are conducted to best address the needs of the learners and check on effectiveness and efficiency of a given or applied teaching, learning method. Formal tasks are subject to moderation for quality assurance and to ensure that appropriate standards are maintained. Formative assessments provide teachers with a systematic way of evaluating how learners are progressing in Physical Science. It is important to ensure that during a school year, all content for Physical Science is covered, the full range of skills is included and a variety of different forms of assessment are used (DoBE, 2011:143). However, each form of assessment requires learner and teacher support material in Physical Science to be implemented effectively.

2.6 STRATEGIES NEEDED TO IMPROVE THE TEACHING OF PHYSICAL SCIENCE IN SCHOOLS

The use of exploration-explanation sequence of instruction to teach Physical Science, in which the teachers may allow learners to predict, share, observe, and explain helps learners to understand what they are learning (Brown & Friedrichsen, 2011). For example, in the test of starch in a leaf they must include a demonstration; learners need to predict what will happen when the teacher adds iodine on the leaf. At this point, it is important to have learners execute an outcome and predict what they think will happen. Learners are expected to write their prediction on a paper and then share their predictions to provide an explanation to their peers. Based on their observations, learners will discuss with their peers and write down their explanations on the chalkboard for class discussions. In addition, Brown and Friedrichsen (2011) state this method allows every learner to engage in the teaching and learning activities and is actively involved in the learning process.

Another possible strategy that may be employed in the teaching and learning of Physical Science is cooperative learning, which Kilic (2013:144) defines as a "learning method in which learners form small mixed groups; help each other's learning; allow their self-confidence to increase their communication and problem-solving skills; and develop their critical thinking skills". These techniques create a platform for learners to actively participate in the teaching and learning process. Cooperative learning develops the thinking skills of learners and helps the learners to achieve the learning objectives in an effective way at the same time as increasing learning responsibility in the learners and providing an exploratory and effective learning environment for learners in the classroom. Kilic (2013) notes that these techniques; however, differ in the social structure of the environment, the physical structure of the classroom, the course and activities that will be performed.

Furthermore, Kilic (2013) states that these techniques maintain social relationships and provide learners with learning responsibilities. Therefore, when Physical Science educators are employing different teaching methods it is important to consider their classroom seating arrangement to allow interactions among the learners and the type of activity being learned. Garcia (2003) regards one possible way to improve the

teaching of science in schools as alerting teachers that science subjects are more than just a set of activities, but there are several aspects science teachers need to consider to teach science effectively. These aspects embrace the science content and the processes used by the scientist and good organisational management. Therefore, it is important for Physical Science teachers to plan their lessons if they are to identify all possible concepts that might bring potential misunderstanding among learners when presenting the lesson.

There are very few studies conducted on research about educators' views and learners' views on factors that contribute to poor performance in Physical Science in Grade 12. This study will be fruitful for educators, learners, DoBE and all the stakeholders including community members for the improvement of matric results more especially those achieved in Physical Science.

2.7 CHAPTER SUMMARY

In this chapter the relevant literature that forms the theoretical foundation of the study was explored. The performance of Grade 12 Physical Science as found in related studies by various researchers was critically examined. The inadequacies that were found to be inherent in the current studies on the teaching and performance of Physical Science were highlighted. The justification for the need for a paradigm shift in examining poor performance of Grade 12 Physical Science in South Africa took center stage in this chapter. The chapter also interrogated the views of teachers and learners regarding the factors that influence poor performance of Grade 12 Physical Science learners and explored how the Resource-Based Theory has been advanced to explain the related physical, material and human resources that contribute towards the performance of Grade 12 Physical Science. This was followed by a comprehensive review of literature on the strategies that can be implemented by the stakeholders to improve the performance of students in learning of Physical Science by Grade 12 learners in South Africa. In Chapter 3, the methodological framework which encompasses the philosophical underpinnings that guided the conduct of the research and the actual methods employed in the data gathering are discussed in detail.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter presents the detailed methodological components used for research. It outlines the research paradigm, research design, target population, sampling and sampling procedures, research instruments, data collection procedures, data analysis and ethical considerations followed within this study. The principal objective of this study was to find answers to the following research questions:

- What are the learners' views on factors that contribute towards poor performance in Grade 12 Physical Science?
- What are the educators' views on factors that contribute towards poor performance in Grade 12 Physical Science?

3.2 RESEARCH PARADIGM

Within this study the researcher employed both quantitative and qualitative approaches thus adopting a mixed method paradigm. The quantitative approach according to Grinnell and Unrau (2005:82) is more effective than the qualitative approach in attaining specific and precise understanding of an aspect or part of an already well-defined problem, on the other hand the qualitative approach seeks to answer research questions that provide a more comprehensive understanding of a problem from an intensive study of a few people, thus both these approaches sufficed for this study.

3.3 RESEARCH DESIGN

The researcher specifically selected the triangulation mixed method design; which is a one-phase design in which the researcher intended to use both quantitative and qualitative methods during the same time frame and with equal weight to best understand the phenomenon of interest. Basically, it involved the concurrent, but separate collection and analysis of quantitative and qualitative data in order to

compare and contrast findings (De Vos, Strydom, Fouche & Delport, 2011:442), thus it enabled the researcher to gain much insight into poor performance of learners.

The researcher has specifically selected this design on the assumption that the use of both quantitative and qualitative methods in combination provided a better understanding of the research problem and question than either method by itself (McMillan & Schumacher, 2006). Furthermore, the rationale for the mixed method is that it is more flexible and enabled the researcher to delve into a deeper understanding of the educators' views and learners' views, beliefs, ideas, fears and thoughts about Physical Science.

3.4 TARGET POPULATION AND SAMPLING PROCEDURES

The target population of this study was the Grade 12 learners and educators from FET phase of the school system doing Physical Sciences. De Vos et al. (2011:223) defines a sample as comprising elements or subsets of the population considered for actual inclusion in the study, or it can be viewed as a subset of measurements drawn from a population in which the researcher is interested in. This study employed non-probability sampling strategy, specifically adopting a purposive sampling approach.

Since this research study was also of a small scale in nature, exploring both educators' and learners' views on factors that contribute towards poor performance of Grade 12 Physical Science, the researcher felt that purposive sampling was most effective. The researcher considered subjects who happened to be accessible and who represent the population targeted in the study. This study was conducted in the UMkhanyakude district, which is one of the eleven district municipalities within KwaZulu Natal. The researcher selected Kwamsane circuit under UMkhanyakude district, because of the poor performance in Grade 12 matric results during national examinations in Physical Sciences. The researcher selected a convenient sample of five secondary schools from this circuit. Two educators teaching Physical Science in Grade 12 from each of the five schools were selected, thus ten educators formed part of the sample for the interview. With regard to the selection of learners the researcher allowed the educator who was teaching Physical Sciences in Grade 12 to

select 20 learners per school, maintaining a balance between gender, thus one hundred Grade 12 learners completed the questionnaire.

3.5 RESEARCH INSTRUMENTS

In this research, questionnaires and interviews were used to collect data. According to Johnson and Christensen (2004:164), “a questionnaire is a self-report data collection instrument that research participants fill out as part of a research study.” The questionnaire was designed incorporating both open-ended and closed-ended questions addressing the first research objective. The closed-ended questions are useful for eliciting factual information and the open-ended questions enabled the researcher to delve deeper into learners’ views on factors that contributed towards their poor performance. The questionnaire for learners had closed-ended items with a four point likely scale (Strong Agree, Agree, Disagree and Strongly Disagree) and had a section allowing the participants to comment under open-ended questions. The researcher decided to include open-ended questions as it enabled the participants to write a free account in their own terms, to explain and qualify their responses; thus provided greater insight into the choice of their answer which was of greater benefit to the study. The questionnaire was written in both English and IsiZulu to gather information from the learners even those who did not understand English well were accommodated. The data were later translated into English.

The researcher first informed all the respondents that information provided would be treated with confidentiality and anonymity, their names would not appear anywhere and that they must feel free in answering the questions. The Grade 12 learners filled in the questionnaire with little guidance from the researcher. At all five schools, the questionnaires were administered by the assigned educators (one per school) and were collected by the researcher after ten days. The researcher used a questionnaire in this study, because of the following reasons as indicated by Gall, Gall and Borg (2009):

- It is a quicker way of obtaining information from a larger group of people;
- A questionnaire requires less time to administer than other methods of data collection; and
- Questionnaire responses are also easy to analyse.

According to Koshy (2010) an interview is a systematic way of talking and listening to people and is another way of collecting data from individuals through conversations. They further note that the questions for an interview should be carefully planned and precisely worded to yield the kind of data the researcher needs to answer for the research questions or objectives. In this research study, the semi-structured interviews were used to collect data from the educators teaching Physical Science in Grade 12. The second objective was addressed through semi-structured interviews whereby those interviewed were provided an opportunity to express themselves freely thus providing a greater variety of information. The semi-structured interviews elicited perceptions, views and experiences of educators in relation to the factors that contributed towards learner's poor performance.

Probe questions were posed where necessary which enabled the participants to further verify and clarify their answers, thereby adding to the data. According to Gill, Steward, Treasure and Chadwick (2008) qualitative methods such as interviews are believed to provide a deeper understanding and detailed insights of the phenomena as compared to purely quantitative methods, such as questionnaires, thus the researcher also opted for interviews.

All activities concerned with data collection were carried out after school hours and also during weekends and spring school holidays so as not to disrupt the functionality of the schools involved. Prior to the collection of data each school was visited and necessary appointments were scheduled accordingly. At each school, interviews with the educators were conducted individually in a private room in order to promote trust and confidentiality for the study. A voice recorder, researcher's cell phone and hand written notes were used to record the conversations during the interviews. The reason for using a voice recorder, researcher's cell phone at the same time was to rescue the researcher from missing information in case one was malfunctioning. The researcher got the permission from the interviewees to use the voice recorder and the cell phone to record the interviews.

3.6 PILOT STUDY

To ensure reliability and validity of the questionnaires and semi-interview, a pilot study was carried out with 40 Grade 12 learners and two educators at school A which did not form part of the sample. School A is one of the schools that offer Grade 12 Physical Sciences at Kwamsane circuit. Both instruments were tested on the same respondents. The reason for piloting the instruments was to determine whether the instruments were understandable and appropriate to the needs of the study in order to make some adjustments or retain them as they were (Dipoy & Gitlin, 2011).

During the pilot study the researcher performed all the necessary tasks that were expected to be carried out within the main study. After collecting the data, the researcher analysed the data to determine which items needed to be discarded, corrected, rephrased and retained. During the analysis the results obtained from the pilot study, the researcher found that some respondents ticked more than one answer for each question; they ticked both in English and IsiZulu. Thus the researcher made an adjustment to the questionnaires whereby learners had to only select between English and IsiZulu. Necessary adjustments were made after the pilot study and changes were positively affected on the final instruments. The semi-structured interviews did not require to be piloted as the researcher was present during the interviews and could easily clarify each of the questions, if participants needed some clarity.

3.7 DATA ANALYSIS

An analysis of data begins from the specific and builds up towards general patterns and the researchers' responsibility is to look for relationships among the different dimensions in the collected data (Johnson & Christensen, 2012). The quantitative data generated from closed-ended questions in the questionnaires were first coded, entered and analysed using the Statistical Package for Social Sciences, mainly using descriptive statistics (frequency tables) and percentages. Furthermore, thematic analysis was used to analyse data from the open-ended questions within the questionnaires as well as data from the semi-structured interviews. Howitt and

Cramer (2010) suggest that thematic analysis is most commonly used for the analysis of qualitative data.

For interviews, interpretational analysis was used in order to ensure that important constructs, themes and patterns that emerged from the data were identified (Gall et al., 2009). The data analysis began with preparing the database containing all the data collected during the study. This was in a form of the completed questionnaires, field notes and transcripts from the recording devices used. After the generation of data, the transcription of the interviews and coding and analysis took place. Data collected was numbered and divided into meaningful themes. According to Gall et al. (2009), coding is the process of categorically marking or referencing units of text with codes and labels as a way to indicate patterns and meaning. Themes that were occurring most frequently were put together and discussed and became the major findings of the study. Thus, data analysis was conducted in conjunction with the research objectives. The triangulation of data from both the instruments yielded rich data.

3.8 VALIDITY AND RELIABILITY

One of the ways to enhance validity lies in the appropriate use of research instruments, which should allow the researcher to achieve the research objectives (Henning, Van Rensburg & Smith, 2004; Hoepfl, 1997). The validity of a study is also determined by the extent to which instruments and methods ‘measure’ what they are intended to measure or how truthful the research results are (Henning, Van Rensburg & Smith, 2004).

Furthermore Worthen, Borg and White (1993) define reliability as the measure of how stable, dependable, trustworthy and consistent a test is in measuring the same thing each time. Therefore, it is important that the researcher maintains a comprehensive protocol of his study, in case others may be interested in checking its reliability (Sekaran, 2003). To achieve reliability in this study, research questions and interviews were pre-reviewed, to check for unclear and ambiguous questions. In order to be as non-threatening as possible to participants, and to ensure reliability of

data, the participants were informed beforehand about the mission of the researcher in their schools. Furthermore, the participants were free to use either English or IsiZulu as their preference. Some of the questions were asked in both English and in IsiZulu to ensure that they understood them. In order to clearly express their feelings well, some of the learners responded in IsiZulu.

According to McMillan and Schumacher (2006), qualitative researchers commonly use a combination of mechanisms to enhance reliability of the collected data. Hence, all interviews were recorded and precisely transcribed. McMillan and Schumacher (2006) regard validity of a qualitative research design as the degree to which interpretations and the concepts have mutual meaning between the participants and the researcher. Hence, the researcher and participants should agree on the descriptions and the meanings of the different occurrences. Therefore, to enhance validity in this study, the following were strictly observed:

- Participants' words were transcribed as they were spoken;
- Multi-data collecting techniques were used; and
- Data collected were compared to check its validity.

Each participant was given a copy of the transcriptions of the interviews to check its validity. The questionnaires were numbered and their contents entered into a computer code sheet and all the sections were found to be reliable.

3.9 LIMITATIONS OF THE STUDY

The following limitations of this study are outlined for directing future studies as it is clear that more research is needed. The sample of this study was drawn from educators and learners in the Kwamsane Circuit under UMkhanyakude District of KwaZulu-Natal province only; therefore, it is not representative of the entire population of Grade 12 educators and learners in this country. Further studies need to be conducted in other districts and provinces. However, this study does provide some insight into both educators 'and learners 'views within a particular context and time frame.

3.10 ETHICAL CONSIDERATIONS

Firstly, the researcher obtained ethical clearance from the University of Zululand Postgraduate Research Ethics Committee through the Faculty of Education under the Department of Curriculum and Instructional Studies (Appendix G). A permission letter to carry out the study was sought from the KwaZulu-Natal Department of Education which was approved (Appendix C). A letter to obtain the necessary permission was also drafted and was personally handed to the Circuit Manager of the Circuit UMkhanyakude district together with a copy of the questionnaire and interview schedule (Appendix B). Furthermore, permission letters were also provided to each principal of the selected schools (Appendix B) clearly explaining the entire process. All of the necessary permission letters were also presented during the collection of data to each of the schools.

Before the collection of data, with regard to the commencement of the interviews and completion of the questionnaires, the researcher briefly explained the objectives and purpose of the study to all the participants. The educators were given consent letters to read, sign and indicated their willingness to take part in the research. A consent form was also sent to each of the parents of the learners who took part in this research, requesting parents to sign an agreement for allowing their children (learners) to participate in this study. These consent forms were written in both English and isiZulu to enable parents to have a better understanding of what the form entailed. All participants were also assured of confidentiality and that their responses would only be used for research purposes and would not be disclosed to any other people. To ensure anonymity, names of participants together with the name of the school were not reflected on the questionnaire. Also during the interviews the participants were not requested to state their names. Participation in this study was voluntary as no one was forced to take part. The participants were also informed of their right to decline or withdraw from the study any time they felt pressured from the questions asked. The research participants were assured that refusing to participate or withdrawing from the study would have no adverse effect on them.

3.11 CHAPTER SUMMARY

This chapter focused on the research methodology used to collect the data from the participants. The research paradigm, research design, population, sample and sampling procedures, research instruments, pilot study, data collection procedures, data analysis and ethical considerations were also discussed. The analysis and presentation of the research results are the focus in the next chapter.

CHAPTER 4: PRESENTATION AND INTERPRETATION OF THE FINDINGS

4.1 INTRODUCTION

The previous chapter captured the methodology that was adopted for the purpose of gathering and analysing data for this study. This chapter presents the analysis, interpretation and discussion of findings on the data collected to answer the research questions of the study and to determine the trends and relationships among the construct or variables of the resource-based view, which is the theory that underpinned this study. Furthermore, the researcher explicitly showed how the results and the conclusions of the study relate to the literature reviewed including the theory that underpins the study. The discussions in this chapter are guided by the research questions, namely:

- What are the learners' views on factors that contribute towards poor performance in Grade 12 Physical Science?
- What are the teachers' views on factors that contribute towards poor performance in Grade 12 Physical Science?

Firstly, the researcher focuses on the analysis and interpretation of data collected through the questionnaires which determined the learners' views about factors that contributed towards poor performance in Grade 12 Physical Science. The data from the closed-ended questions are presented within frequency distribution tables and are complemented by the embedded open-ended questions. Secondly, the researcher focuses on the analysis and interpretation of data collected through the semi-structured interviews which determined the teachers' views about factors that contributed towards poor performance in grade 12 Physical Science in relation to common themes.

4.2 LEARNERS' VIEWS ABOUT POOR PERFORMANCE IN PHYSICAL SCIENCE

4.2.1 Teaching, learning and assessment in Physical Science

Views on teaching methods

The analysis of data presented in frequency distribution Table 4.1 shows participants' responses regarding whether the teacher uses teaching methods in a way that makes sense and is easy for learners to understand the content being taught in Physical Science.

Table 4.1: Teaching methods

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	13	13,3	13,3	13,3
	Disagree	13	13,3	13,3	26,5
	Agree	51	52,0	52,0	78,6
	Strongly agree	21	21,4	21,4	100,0
	Total	98	100,0	100,0	
Missing	System				

As can be seen in Table 4.1 of the 98 (n=98) learners who completed the questionnaire 52% agreed and 21,4% of the learners also strongly agreed that teachers use teaching methods in a way that makes sense and makes it easier for them to understand the content being taught in Physical Science. This finding implies that most of the Grade 12 Physical Science learners who participated in this study believe that the teaching methods make sense to them. Other studies have also noted the importance of teaching strategies used during Physical Science, particularly when addressing unfamiliar terminologies (Bennett, 2003). In addition, this study also revealed that teachers were most likely to use unfamiliar terminologies without explaining them in detail; which leads learners becoming even more confused. A similar study has also noted the way in which a lesson is presented and the choices of teaching strategies that are adopted. These aforementioned choices of teaching strategies determine its effectiveness and the level of understanding by the learners (Mwenda, Gitaari, Nyaga, Muthaa & Reche, 2013:95).

Learner participation in class activities

Results in Table 4.2 show learners' views on whether the teacher allows them to participate in class activities during Physical Science lessons.

Table 4.2: Participation in class activities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	5	5,1	5,3	5,3
	Disagree	8	8,2	8,4	13,7
	Agree	33	33,7	34,7	48,4
	Strongly agree	49	50,0	51,6	100,0
	Total	95	96,9	100,0	
Missing	System	3	3, 1		

Fifty percent (50%) of the participants as indicated in Table 4.2 strongly agree that teachers allow them to participate in class activities during Physical Science lessons, while 33,7% agree. Thus, the majority (83.7%) of the learners in the sample confirmed that the teacher allowed them to participate in class activities as compared to a minority (13.3%) of learners who strongly disagreed. This was supported by Menekse, Stump, Krause and Chi (2013) who state that the main constructs of active learning are the participation and the engagement of learners with concrete learning experiences, knowledge construction of learners through meaningful learning activities, and some degree of learner interaction during the process.

Views on group work during Physical Science lesson

The results on Table 4.3 show learners' views on whether the teacher allows them to work in groups during Physical Science lessons.

Table 4.3: Views of group work lessons

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Strongly disagree	64	65,3	66,0	66,0
	Disagree	14	14,3	14,4	80,4
	Agree	11	11,2	11,3	91,8
	Strongly agree	8	8,2	8,2	100,0
	Total	97	99,0	100,0	
Missing	System	1	1, 0		

65,3% of learners strongly disagreed that teachers allow them to work in groups during lessons for Physical Science, while 14,3% disagreed. The high percentage of negative responses (79,6%) in this item shows that teachers are not allowing learners to work in groups during lessons. Contrastingly, a study conducted by Petty (2009) notes that group work gives learners an opportunity to apply the methods, principles and concepts that they are being taught in their lessons and allows shy learners who do not contribute during the whole class a platform on which to make contributions to a group further enhancing their understanding of Physical Science.

Views on individual class activities

The data in Table 4.4 represent learners' responses on whether they are allowed to do class activities as individuals.

Table 4.4: Views on individual class activities

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Strongly disagree	4	4,1	4,1	4,1
	Disagree	4	4,1	4,1	8,2
	Agree	22	22,4	22,7	30,9
	Strongly agree	67	68,4	69,1	100,0
	Total	97	99,0	100,0	
Missing	System	1	1,0		

Table 4.4 indicates that 4,1% of learners strongly disagreed and disagreed that their teacher allows them to do class activities as individuals, while 22,7% agreed and 69,1% strongly agreed. This finding indicates that a high percentage of class activities encourage learners in each school that participated in this study to work independently in Physical Science. Individual activities help learners to remember and understand what they have learnt and further assist the teacher to find out if they are able to answer questions related to the content taught in Physical Science. However, it is critical that Physical Science teachers engage learners in class activities that include the necessary science process skills, thereby ensuring learners develop a deep understanding of scientific knowledge (Mkandawari, 2009).

Views on regular class activities and feedback

The results in Table 4.5 indicate learners' responses on whether the teacher provides regular activities and feedback to learners.

Table 4.5: Views on regular class activities and feedback

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Strongly disagree	8	8,2	8,2	8,2
	Disagree	39	39,8	39,8	48,0
	Agree	17	17,3	17,3	65,3
	Strongly agree	34	34,7	34,7	65,3
	Total	98	100,0	100,0	100,0
Missing	System				

As can be seen from Table 4. 5 8,2% strongly disagree and 39,8% of learners disagree, while 17,3% agree and 34,7% strongly agree. Thus, the minority of learners (48%) which is almost half of the participants in this study believed that there are insufficient tests, class work and class activities and irregular feedback for Physical Science. Research evidence indicates that both informal and formal assessment for learners increase learning opportunities for all learners that are

studying Physical Science. Petty (2009) supports that the most effective teaching methods allow teachers to do less, and the learners to do more by actively participating in their learning activities.

Views on revision material

The information in Table 4.6 indicates whether learners are provided with adequate revision material in Physical Science.

Table 4.6: Material for revision

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	65	66,3	66,3	66,3
	Disagree	4	4,1	4,1	70,4
	Agree	14	14,3	14,3	84,7
	Strongly agree	15	15,3	15,3	100,0
	Total	98	100,0	100,0	
Missing	System				

Table 4.6 indicates that 66,3% of learners strongly disagreed and 4,1% disagreed that teachers provide them with previous question papers and memorandum and work books for revision. However, 14,3% agreed and 15,3% strongly agreed that they received adequate revision materials from their teachers. This finding reveals that the majority of the learners (70,4%) within this study confirmed that teachers do not provide them with adequate previous question papers and memoranda and work books for revision purposes. Al Maghragy and Alshami (2013) believe that science teachers need to use teaching methods which are flexible, creative, and more learner-centred, in order to accommodate different learning styles of learners. Simply, this means that teachers need to provide sufficient opportunities for learners during the revision process, thereby exposing them with relevant material to enhance their understanding and facilitate their practise of skills.

Views on laboratory experiments

The data presented in the frequency distribution Table 4.7 indicate learners' responses on whether teachers conduct experiments in the laboratory with them.

Table 4.7: Laboratory experiments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	5	5,1	5,1	5,1
	Disagree	2	2,0	2,0	7,1
	Agree	23	23,5	23,5	30,6
	Strongly agree	68	69,4	69,4	100,0
	Total	98	100,0	100,0	
Missing	System				

The data as presented on Table 4.7 indicates that 5,1% of learners strongly disagreed, 2,0% disagreed while 23,5% agreed and a higher percentage of 69,4% strongly agreed that teachers conducted experiments with them in the laboratory. The findings indicate that a large number of learners (92,9%) who participated in this study confirmed that their teacher conducted experiments in the laboratory. However, 7% of learners were still disadvantaged by not being exposed to laboratory experiments. According to Mji and Makgato (2006:260) attending laboratory sessions is important in the learning of Physical Science, as practical work in a way brings to life what is explained in textbooks. By enabling learners to view educators demonstrating and conducting experiments themselves, simply supplements what is in textbooks thus these activities enhance their learning. Furthermore, an advantage of laboratory usage helps them improve their higher order learning skills, such as analysis, problem solving, and evaluation.

4.2.2 Learner teacher support material

Views on suitable Physical Science textbooks

Table 4.8 indicates the use of suitable Physical Science textbooks by learners.

Table 4. 8: Suitable Physical Science Textbooks

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Strongly Disagree	67	68,4	68,4	68,4
	Disagree	5	5,1	5,1	73,5
	Agree	13	13,3	13,3	86,7
	Strongly agree	13	13,3	13,3	100,0
	Total	98	100,0	100,0	
Missing	System				

Of the 98 participants Table 4.8 indicates that 68,4% of them strongly disagreed, 5,1% disagreed while 13,3% agreed and 13,3% strongly agreed with the statement posed to them regarding usage of suitable textbooks during Physical Science lessons. This means that the majority of learners (73, 5%) believed that Physical Science textbooks were not suitable. However Likoko, Mutsotso and Nasongo (2013), emphasise that effective teaching cannot take place in the classroom if basic instructional resources are not available, especially in relation to textbooks.

Views on additional learner teacher support material

Table 4.9 indicates the views of learners on whether teachers make use of additional learner teacher support material to enhance learning of Physical Science.

Table 4.9: Additional learner teacher support material

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Strongly disagree	70	71,4	71,4	71,4
	Disagree	12	12,2	12,2	83,7
	Agree	7	7,1	7,1	90,8
	Strongly agree	9	9,2	9,2	100,0
	Total	98	100,0	100,0	
Missing	System				

The majority of the participants 71,4% strongly disagreed and 12,2% disagreed. The high percentages (83,6%) of negative responses show that learners believe that their teachers do not make use of additional learner teacher support material to enhance learning of Physical Science. Much research evidence indicates that learner-teacher support material encourages and strengthens the interaction between both teachers and learners, with the aim of improving learner performance (World Bank, 2008; Fleisch, Taylor, Herholdt & Sapire, 2011).

Laboratories and their use in the school

The questionnaire also included statements to determine learners' views on the availability of a science laboratory in their school, and the nature of equipment found in the laboratory in schools where a laboratory is available. These statements were designed to triangulate the learners' responses in that the same question was asked in different ways. The statements were as follows:

- *Our school has a laboratory and we use it to do practical experiments;*
- *Our school laboratory has all the equipment to conduct all practical experiments for our Grade 12 Physical Sciences syllabi;*
- *Our school has a laboratory, but with few equipment, so we cannot do all practical experiments for our Grade 12 Physical Sciences syllabi; and*
- *Our school has no laboratory and we cannot do any practical experiments for our Grade 12 Physical Sciences syllabi.*

For example, the first and last statements require learners to indicate whether there is a laboratory or not in their school; while the second and third statements require learners to indicate if there is availability of equipment in the existing laboratories. Tables 4.10, 4.11, 4.12, and 4.13 below present findings for each of the statements above respectively.

Table 4.10: Availability of laboratory in the school

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	2,0	2,0	2,0
	Disagree	1	1,0	1,0	3,1
	Agree	65	66,3	66,3	69,4
	Strongly agree	30	30,6	30,6	100,0
	Total	98	100,0	100,0	
Missing	System				

Table 4.11: Laboratory has equipment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	27	27,6	27.6	27,6
	Disagree	49	50,0	50,0	77,6
	Agree	9	9,2	9,2	86,7
	Strongly agree	13	13,3	13,3	100,0
	Total	98	100,0	100,0	
Missing	System				

Table 4.12: Laboratory has limited equipment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	16	16,3	16,3	16,3
	Disagree	18	18,4	18,4	34,7
	Agree	9	9,2	9,2	43,9
	Strongly agree	55	56,1	56,1	100,0
	Total	98	100,0	100,0	
Missing	System				

Table 4.13: No laboratory in the school

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	75	76,5	77,3	77,3
	Disagree	15	15,3	15,5	92,8
	Agree	4	4,1	4,1	96,9
	Strongly agree	3	3,1	3,1	100,0
	Total	97	99,0	100,0	
Missing	System	1	1,0		

Table 4.10 indicates that of the 98 learners, 66,3% of the learners agreed that their school has a science laboratory, while 30,6% strongly agreed. The two added together indicate that about 96,9% of the learners said that their school has a science laboratory. Table 4.11 shows that 50,0% of the learners disagreed that their school science laboratory has sufficient equipment for them to carry out experiments, while 27,6% strongly disagreed. The two percentages calculated together show that a total of about 78,2% of the learners disagreed that their school science laboratory has adequate equipment required for their science experiments.

Table 4.12 indicates that most learners believed that the school laboratory has very limited equipment. About 56,1% learners strongly agreed while 9,2% agreed. This

eventually leads to 65,1% of learners who agreed that their school science laboratories have limited equipment to carry out experiments.

Table 4.13 indicates that 77,3% of the learners strongly disagreed that their school has no science laboratory, while 15,5% disagreed. In total, about 92,8% of the learners disagreed that that their school has no science laboratory.

Taking into consideration the triangulated statements on the questionnaire represented herein between Table 4.10 and 4.13, and between Table 4.11 and 4.12; the key finding here is that the majority of the learners agreed that their school has a laboratory, and that their school laboratories are not well equipped to carry out the required experiments.

Links have been made between the availability of a school science laboratory or science laboratory model and design and impact on teaching and learning experiences. Veloso and Marques (2017) for example found that teachers were unhappy about the features which were removed from an older model of the laboratories which included electrical sockets and water taps on each table. The newly renovated laboratory design focused on creating a flexible space and in so doing excluded essential aspects which were available in the older model. Teachers expressed that the new design made it hard to do practical experiments with learners, and to assess the learners' ability to conduct the experiments. They also expressed their unhappiness with the separate storage space from the lab tables as it is too far away and wastes time for experimentation.

This finding corroborates the current finding in that they both found that a laboratory design and equipment impact the teaching and learning experiences in a negative way should they be found lacking in one way or another. This is because the majority of the learners in the study indicated that the limited equipment in the laboratories impedes the carrying out of required experiments.

Unavailability of resources

Table 4.14 reflects responses of learners regarding the unavailability of resources and whether it affects their performance in Physical Science in a negative way.

Table 4.14: Unavailability of resources

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	8	8.2	8.2	8.2
	Disagree	5	5.1	5.2	13.4
	Agree	32	32.7	33.0	46.4
	Strongly agree	52	53.1	53.6	100.0
	Total	97	99.0	100.0	
Missing	System	1	1.0		

Table 4.14 indicates that 8,2% of learners strongly disagreed, 5,1% disagreed, 32,7% agreed and 53,1% strongly agreed with the statement that unavailability of resources affects their performance in a negative way. These findings seem to be corroborated by findings from the above statements (Tables 4.10, 4.11, 4.12, and 4.13) especially with regard to laboratories and their use in their schools. Although the majority of the learners agreed that their school has a laboratory; they believed that their school laboratories are not well equipped to carry out the required experiments thus affecting their performance in a negative way. Similar studies concur with the findings from this study. Likoko et al. (2013) emphasise that the availability of teaching-learning resources is important for effective teaching and unavailability of materials, such as apparatus and chemicals, may have a negative effect on teaching and learner performance. Furthermore, Grossman and Thompson (2008) reveal that the effective use of learning materials also depends on the way in which teachers use these materials for effective teaching and learning, thus both availability and the manner in which these materials are used makes a difference.

Learner support

The questionnaire also required learners to indicate whether they receive extra support from the school and from family members. The learners had to indicate on a four point Likert scale of disagree, strongly disagree, agree, and strongly agree. Below are the statements they had to indicate their level of agreement on:

- *My school provides extra classes for Physical Science during the week day, afternoons, weekends and holidays; and*
- *One of my family members helps me with Physical Science home works and other activities*

The tables below present findings on the learners' levels of agreement with the above statements respectively.

Table 4.15: School provides extra classes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	73	74,5	75,3	75,3
	Disagree	5	5,1	5,2	80,4
	Agree	8	8,2	8,2	88,7
	Strongly agree	11	11,2	11,3	100,0
	Total	97	99,0	100,0	
Missing	System	1	1,0		

Table 4.15 above indicates that the majority of learners do not receive extra classes after school or during weekends. Seventy four percent (74,5%) of learners strongly disagreed and 5,1% disagreed with the statement that teachers give extra classes. The findings indicate that the majority of learners were unable to receive extra classes for Physical Science. Research has revealed that extra lessons contribute positively to learners' academic performance. Mouza et al. (2016) for example found that the middle school learners who participated in the after school programme for a computing programme were positively influenced in the area of computer science concepts and their attitudes toward computing. It can therefore be deduced that

learners in the current study may not be able to take advantage of the benefits of extra classes, since they report that these classes are not provided in their schools.

Table 4.16: Family member assistance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	54	55,1	55,7	55,7
	Disagree	20	20,4	20,6	76,3
	Agree	14	14,3	14,4	90,7
	Strongly agree	9	9,2	9,3	100,0
	Total	97	99,0	100,0	
Missing	System	1	1,0		

Table 4.16 above shows that parental involvement in assisting learners with Physical Science activities is very limited. The table indicates that 55,1% of the learners strongly disagreed that their family members help them with Physical Science homework and other activities, while 20,4% disagreed. Taken together, the findings indicate that the majority of the learners lack support at home for Physical Science. Parental or family involvement has been found in other studies to result in positive learner academic performance (Dhurumraj, 2013). Khumalo (2014) also found that parents played a role in reviewing and contributing to homework given to their children and have capacity to help learners meet the learning outcomes. It is pssible that learners in this study may lack in the academic success with the majority of them reporting that they do not receive parental of family support outside the school.

Class size

The large majority of the participants from the open-ended questions in the questionnaires expressed discontent about the large class size and believed that it affected their performance in Physical Science. Participant 6, for example, highlighted the view that their Physical Science class is overcrowded and challenges are experienced especially while doing experiments:

We can't even see when the teacher is demonstrating an experiment in front of the class, because the class is so full, and when we do the experiments ourselves we have to share the apparatus with too many learners in our groups, and we don't get a chance to do them ourselves (P6).

Participant 5 concurred, indicating that the teacher also struggles in maintaining discipline especially during practical sessions and is unable to provide individual attention and assist those that are experiencing difficulty:

When our teacher shows us the experiments, we can't even hear what he is saying, some learners are talking but he tries to scold them. Our class is so overcrowded there is no space for our teacher to walk around and come help us in our groups, sometimes we don't know what to do (P5).

The findings indicate that learners do experience challenges with overcrowded classrooms which somehow hinders both teaching and learning, thus affecting their performance. Furthermore, it is likely to be more difficult for the teachers to employ the effective teaching methods, such as group work, problem-based learning and practical work in their teaching processes. Folashade and Aiknbobola (2009) reveal that large class size has a negative effect on the learners' performance in science, because teachers cannot engage and assist all the learners during the lessons. Another similar study by Kandjeo-Marenga (2011) was carried out in Namibian secondary schools; and reveal that teachers find it difficult to teach science practical work, because some schools have small laboratories which cannot accommodate large numbers of learners.

Views of learners on the use of home language in Physical Science

All the participants that participated in the study affirmed that if Physical Science was to be taught in their home language (IsiZulu) they would have a better understanding of the subject and they believed that their results would also improve. They complained about the difficulty they experienced in understanding the language of teaching and learning (English) and the language of science itself:

I struggle to understand some concepts when my teacher explains it in English, but when he repeats it in IsiZulu and gives us examples in IsiZulu it is much

better. Sometimes when our teacher asks us questions in English, nobody raises their hand and wants to answer; it's because we do not understand the question, my teacher then asks the same question in IsiZulu just to make us understand and speak (Participant 14).

Most Physical Sciences learners within the South African context have to study Physical Science in their second or even third language apart having to understand the language of Science. They also need to be able to master the medium of instruction thus this can somehow be disadvantageous especially to second language learners. This disadvantages learners to a large extent (O'Brien, 2011:38). Moreover, Matjila (2004) states that the learners' understanding and their performance in a certain subject might be affected by the medium of instruction used in the teaching and learning process. Similarly, in a study conducted by Olivier (2011) in Namibia, especially in the northern regions where school resources are poor, it becomes difficult for learners to use English. This means that if learners are sub-standard in English they could be disadvantaged when it comes to taking examinations in English. Also since Physical Science content is in English as well as its examinations, this might negatively affect the teaching process and the learners' performance in Physical Science examination will decrease in disadvantaged schools, this can also be applied to our context.

Time spent on Physical Science

With regard to how much time each learner spent each day reading, completing practice exercise and studying for Physical Science more than three-quarters of the participants indicated that they spend less than two hours each week. The participants stated that they only do Physical Science when their teacher gives them homework which they attempt to do, but in most cases the tasks or activities are difficult for them to do on their own.

Participant 6, for example, stated:

Sometimes, my teachers gives us some homework; I try to do it but the problems are difficult to solve on my own and I get them wrong (P6).

This statement made by a learner concurs with a study conducted by Bevins, Bryne, Brodie and Price (2011) who reveal that Physical Science is difficult for many learners, thus it generally attracts few learners. Mattern and Schau (2002) further confirm that due to its difficulty the success rate is fairly low, thus one may deduce that it is necessary for learners doing Physical Science to spend much time doing suitable activities to enhance their understanding; however this does not seem to be the case amongst these learners in the current study.

Attitude of learners towards Physical Science

More than three-quarters of participants' reflections indicate that they do not enjoy doing Physical Science as a subject. Participants were negative as they felt that Physical Science was difficult with a demanding content, too many complex tasks were done and they were forced to do the subject. Participant 4 stated:

> *My parents forced me to do Physical Science, although I didn't want to so that I get a bursary to study at university, but I am not doing too good, it's just too hard for me, it has too much work and I don't like Physics (P4).*

The findings towards the attitude of learners in Physical Science were common in that their parents are the ones who select their career choices in Grade 10. This means that parents select career choices for their children based on their interests, ignoring the children's choices. Okoye (2002:562) mentions that those learners who come from higher socio-economic status families are generally more motivated to study Physical Science and show a positive attitude towards this subject, since they receive much parental support and are exposed to many resources.

4.3 TEACHERS' VIEWS ON POOR PERFORMANCE IN PHYSICAL SCIENCE

4.3.1 Teachers' profile

The profile information pertaining to teachers within this study is presented in Table 4.17 under the following headings, namely teachers' experience, Physical Science teaching experience and qualifications. The analysis of data which is presented in the frequency distribution Table 4.17 presents participants' responses to Section A of the interview schedule which elicited their necessary biographical information. A

study conducted by Parker (2011) states that advanced qualifications can improve the performance if specialisation was in the subject taught by the teacher.

From the data presented in Table 4.17 the teacher participants teaching Physical Science have varying experience of general teaching and also different levels of experience in teaching Physical Science. All nine participants have a qualification, but only one of the participants has B.Sc. in hydrology which is not regarded as a teacher qualification. The situation in these sampled schools in relation to qualification differs from that in other rural schools, where most science teachers are under-qualified or unqualified to teach Physical Science (Mji & Makgato, 2006).

Table 4.17: Teachers' biographical information

Schools	Teachers	Teaching experience (years)	Physical Science teaching experience (years)	Qualifications
School A	Teacher 1	10	3	BSc in Hydrology and Micro-biology
	Teacher 2	10	5	Diploma in Mathematics and Physical Sciences
School B	Teacher 3	5	4	BEd degree
	Teacher 4	23	23	Teachers Diploma in Maths & Science, Ace (Physical Science) and BEd Honours (Science)
School C	Teacher 5	15	10	ACE in Physical Science
	Teacher 6	5	4	BSc. in Chemistry & PGCE
School D	Teacher 7	5	2	B.Ed. degree
	Teacher 8	7	2	B.Ed. degree
School E	Teacher 9	9	3	BSc. in Chemistry & PGCE
	Teacher 10	4	3	BSc. in Chemistry & PGCE

Table 4.17 shows that eight teachers have 1 to 5 years of teaching experience in Grade 12; 1 teacher with 10 years teaching experience in Physical Science; while

the another one of the teachers has 23 years teaching experience in Grade 12. These findings seem to indicate that 8 out 10 of the Grade 12 Physical Science teachers in these selected samples schools have fewer years of teaching experience as compared to others. These findings concur with those of Harris and Sass (2007) that teachers grow in effectiveness over at least five years of their job, and of Darling-Hammond (2002) who indicates that teachers with less than three years of teaching experience are generally less effective, thus it can be deduced that this can also be applicable relation to this study.

4.3.2 Classroom practice

Challenges

The majority of the participants felt that overcrowded classrooms were one of the challenges affecting the use of effective teaching methods in teaching Grade 12 Physical Science. In the interview, teachers stated that poor discipline among the learners in the classroom was a result of having a large number of learners. One teacher commented about the challenges of overcrowded classrooms during his teaching:

> *I have a large number of learners 55 in each class is challenging, so in most cases you spend time trying to control the learners, and lack of resources is a challenge for us*.

Another teacher concurred, and indicated that a large number of learners in the classroom increase misbehaviour amongst them and it becomes problematic in the school:

> *Large number of learners and lots of misbehaviour, for instance last year one poured beer on a teacher's head and nothing was done after (Teacher 5)*.

The views on the overcrowded classrooms provided by the participants (learners) in the questionnaires and those expressed by the teachers in the interviews were in line with those of Folashade and Aiknbobola (2009). They revealed that a large class size has a negative effect on the learner's performance especially in Science,

because teachers cannot engage and assist all the learners during the teaching process.

Learner support

When teachers were asked about what kind of support and assistance they offer to those learners who are struggling to cope with Physical Science in their classroom, they mentioned that they provide extra-classes in order to accommodate the slow learners. This is an indication that teachers felt extra-classes might improve their teaching process and also improve the Physical Science performance. They believed that extra-classes might provide enough time for them in order to assist all learners (slow learners and faster learners) to understand the content of Physical Science; in addition teachers believed that extra-classes might allow them to finish their syllabus on time so that they can deal with revision. But four of the ten teachers stated that it is also difficult to offer extra-classes, since they travel with common transport and their schools they teach at are located further from town, thus distance creates a challenge. However, the results from the learners' questionnaires contradict that of teachers, as they stated during the open-ended questions that there were no extra extra-classes for Physical Science during school holidays and weekends.

Teaching methods

The majority of teachers indicated in the interviews that they used the following teaching methods: group work and practical work often in their teaching process. One teacher stated:

> *When I group them during practical lessons and revisions they do better, they participate well (teacher 1)*.

However, the results from the teacher's interviews reveal contrasting views in relation to those of the learners about the use of group work. Learners in their questionnaires clearly mentioned that their teachers did not make much use of group work during in Physical Science lessons, but rather preferred the *question and answer method* in their teaching process or methodology.

These findings concur with Kapenda's (2008) as some teachers in Namibia secondary schools prefer traditional methods (lecture and question and answer methods), because teaching methods such as group work and practical work are not easy to use and have many challenges, such as insufficient resources and overcrowded classrooms.

Learners' progress

The majority of participants expressed that some of the learners are doing better whereas there are some who struggle with Physical Science. They posited that the majority of learners who were doing Grade 12 Physical Science progressed (promoted with specific conditions). The regulation of Gazette no. 9886 of 28 December 2012, states that a learner may be retained only once in the Further Education and Training Phase in order to prevent the learner from being retained in this phase for longer than four years. One teacher remarked:

> Yes, *there are just a few learners that are doing well; it's simply because they are capable, but there are many learners in my class who struggle with Physical Science. It would be better if some of these learners repeat Grade 11 instead of pushing them to Grade 12. They can't make it and I don't even know how to help these learners (Teacher 10).*

These findings revealed that some of the teachers were of the view that their Grade 12 learners were not ready to be in Grade 12, and that they also have a poor Physical Science background from the lower grades. Mwamwenda, (2004:497) suggests that effective teachers are the ones who are able to enhance learning amongst their learners. However in this study it is assumed that teachers are struggling to help those learners who experience difficulty in progressing and are of the opinion that it is better for them to repeat Grade 11 instead.

Availability of learner, teacher support material and infrastructure

Teachers were asked whether the availability of learner-teacher support material and infrastructure affects their teaching strategies in the classroom. The majority of the

participants highlighted the lack of suitable and adequate resources. More specifically, the shortage of laboratory facilities to conduct experiments and a shortage of quality Physical Science textbooks were experienced at the secondary schools that participated in this study. During the interviews with the Physical Science teachers, the majority of them said that the lack of resources was a major factor that was affecting the quality and effectiveness of both teaching and learning of Grade 12 Physical Science. During the interviews one of the teachers remarked:

> *We don't have resources at all; yes we have computer labs and science labs, but it's not working, there is not much equipment in there for us to use*.

The views from the participating teachers about the availability of learner-teacher support material and infrastructure were consistent with the views of learners in the questionnaires. The highest (83,6%) of negative responses from the learners believed their teachers were not making use of additional learner teacher support material in order to improve learning of Physical Science was noted as the effect of lack of resources. These findings would appear that the schools involved in this study in the UMkhanyakude district did not have well-equipped resources in their school laboratories. These findings are supported by Kandjeo-Marenga (2011) who states that, most Namibian secondary schools have inadequate resources particularly in their science laboratories for teaching. In addition, Likoko et al. (2013) emphasise that the availability of teaching and learning resources is important for effective teaching to take place. They add that effective teaching cannot take place in the classroom if basic instructional resources are not available. The availability of resources in schools is also influenced by the geographical location.

Teachers were asked whether the geographical location of the school affects the teaching and learning of Physical Science; the majority of participants expressed their views that rural schools are far from town thus learners have limited resources for academic purposes. One of the participant teachers remarked:

> *Yes, we are too far from town, so learners are unable to do their research projects that require library services as they are unable to access them. In addition, the lack of parental involvement contributes a lot. The parents in this area don't bother to monitor the school work and they don't come for the school meetings to check on the performance of their learners* (Teacher 1).

The findings indicate that teaching and learning was not only affected by the unavailability of required teaching material. Moreover, these schools were lacking support from the community members, more especially the parents, hence teaching and learning remain a role for only the teacher and learner. These findings were consistent with the views of the learners in the questionnaire. About (76.3%) of learners agreed that there was no family member that assists them with their school homework for Physical Science. These findings were supported by a study conducted by the Department of Basic Education (2012a:7) which revealed that that parental involvement somehow influences the school environment. Parents must be able to participate in school activities and discuss their children's problems with the teachers. Furthermore, this study underscores that when parents participate and are actively involved in their child's schoolwork, they develop and improve the learning of their child (DoE, 2010:5).

Home language

The teachers were asked if Physical Science were to be taught in the learners' home language would they have a better understanding of the subject and improve. The majority of the participants believed that poor English usage among the learners maybe one of the factors affecting teaching and learning of Physical Science in Grade 12. They believed that their learners' English were not good enough to express themselves and to read and understand the questions during the instructions and activities. Below was one of the teacher's responses:

> *English it's a big barrier for our learners because they don't understand the question well; they fail to read even the instructions* (Teacher 3).

In the interviews, the answers by teachers emphasised that the English language was the main barrier for learners that were studying Physical Science in terms of understanding the instructions and questions during the final examination process. They believed if Physical Science can be taught maybe using isiZulu learners could perform better. These findings were consistent with the views of learners in the questionnaire that they struggle to understand some concepts in English, furthermore the researcher also observed that some of the learners were unable to

complete the questionnaire using English. Other studies reveal that the learners' understanding and performance in certain subjects might be affected by the medium of instruction used in the teaching and learning process (Matjila, 2004). Olivier (2011) also adds that in a country like Namibia, especially in the northern regions where school resources are poor, it becomes difficult for learners to use English.

Assessment

The participants were asked which paper between Paper 1 (Physical Science) or Paper 2 (Chemistry) learners experienced the most difficulties. The great majority of the participants believed that Paper 2 (Chemistry) was very difficult for most of the learners. They believed that learners are not fully exposed to all the practical activities; they mainly have formal practical sessions that limit them in developing a deeper understanding with regard to the Chemistry aspect. These findings further indicate that the lack of resources have an effect on poor performance of learners in chemistry, the informal practical assessment tasks especially for Chemistry in all the sampled school was not conducted due to insufficient and suitable equipment. These findings were consistent with the views of the learners in the questionnaires (Table 4.11) that whereas the schools had laboratories, 77,6% of the learners agreed that there was no presence of equipment in their laboratories to conduct practical work. These findings were also supported by the views of Abrahams and Miller (2008) when they stated that practical work is meaningful in the teaching-learning process as it tends to boost the learners' interest of learning. This means that if the teacher does not allow learners to participate in practical work, this might decrease their interest in Physical Science and also might cause ineffective teaching to take place in the schools.

Support and development

The teachers were asked how often the Subject Advisors, Circuit and district officials visited their schools and how they assisted with the teaching of Physical Science. The majority of the participants indicated that Subject Advisors never visited their schools. The participants also maintained that they only met with the Subject Advisors at the beginning of each year where they discussed the previous year's

Physical Science results for Grade 12. They also discussed the lesson plans that would be used and analysed the challenges that were experienced by the learners in the examination. One of the teachers remarked:

> *We never see the Subject Advisors in this school; we only meet on workshops in February and also during the district moderation and in the submission of SBA (School Based Assessment) towards the end of the year.*

These findings reveal that Physical Science teachers have no support and lack proper monitoring from the subject advisors in their schools and not much is done to assist those teachers who experience challenges in their classrooms in regard to the teaching of Physical Science. Apart from subject advisors providing little support to offer the Physical Science teachers, also learners experienced the lack of support from their teachers. In the questionnaire for learners 70,4% learners confirmed that their teachers do not provide them with adequate previous question papers and memoranda and work books for revision purposes. For the curriculum that has been changing, this study aligned itself with findings by the NSTA (2007) that Physical Science teachers need to continually improve their personal and professional development. Lessing and De Witt (2007) support this by adding that suitable courses should be designed to provide avenues for teachers to refresh their knowledge, to improve their competencies and to bring about a paradigm shift in their outlook towards educational issues.

The curriculum managers from the circuit and also district officials have a role to play in each school for the effective implementation of the curriculum. The majority of the participants indicated that both these officials had visited the school twice in a year in order to check the progress and work covered per subject. They stated that the role of the district officials was to mainly check the number of lesson plans in the teachers' file and also to count the number of learners' activities. These findings revealed that district officials were poorly trained in terms of monitoring the Physical Science work and it is clear from the findings that the responsibilities are merely administrative in nature and lacked much support and development in relation to the subject. Moreover, these findings in this study indicate that there was no common and effective strategic plan for monitoring the Physical Science curriculum in the UMkhanyakude district.

The Physical Science curriculum also lacked proper support even in the school level by the School Management Teams (SMTs). The majority of the participants indicated that lack of teacher support by SMTs members in school demotivates them. The role of the SMTs was to monitor the effective teaching of Physical Science on a daily basis, but teachers and learners received poor supervision which resulted in poor performance in the classroom due to poor plan of the SMTs. The participants were asked what professional development programmes are in place in their schools to assist educators to overcome challenges of teaching and learning of Physical Science. The findings indicate that not all the Physical Science teachers received developmental programmes for Physical Science. One of the participants remarked:

> *There is no professional development programmes you have to work hard nothing else*.

The findings of this study are in contrast with those reported by Mafukata (2016:74) who found that approximately 57,7% of Physical Science teachers have had further education to improve their subject knowledge and current developments in the subject. However, Mafukata (2016:74) still found that approximately 42,3% of Physical Science teachers have not had any further educational development in the subject.

The participants were asked to suggest strategies that could be used by the DoBE to improve the performance of learners in Physical Science. Different views during the interviews were expressed by the teachers. Some of the teachers suggested that there must be specific criteria for learners in choosing Physical Science, while others suggested that, since all the schools within the rural areas have poor infrastructure the DoBE should provide mobile laboratories and libraries so that learners can have access to resources which can enhance both teaching and learning of Physical Science. They also suggested that in each Physical Science classroom there must be a minimum number of learners so as to facilitate effective teaching so that teachers can give individual attention to their learners. Furthermore, they strongly suggested that subject advisors, district officials and the School Management Team provide the necessary support that is needed on an ongoing basis.

4.4 CHAPTER SUMMARY

Chapter 4 presented the analysis and interpretation of the data, both quantitative and qualitative data analysis processes. It is clear that there are several factors that contribute towards the poor performance of Grade 12 Physical Science learners especially in rural schools. All the participants agreed that overcrowded classrooms, lack of material resources, lack of support from teachers, parents, school management teams and district officials and the use of English as the medium of instruction in Physical Science were noted as contributing factors towards the poor performance. In the next chapter that follows the researcher presents the summary of the findings, conclusions and recommendations of the study.

CHAPTER 5: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

Chapter 5 deals with the summary of findings, implications of the study, recommendations and conclusion. The summary of the findings will be outlined in terms of the study aim which was to explore educators and learners' views about factors that contribute to poor performance of Grade 12 Physical Science in UMkhanyakude district, with specific objectives to:

- determine learners' views on factors that contributes towards poor performance in grade 12 Physical Science; and
- determine teachers' views on factors that contribute towards poor performance in Grade 12 Physical Science.

5.2 SUMMARY

5.2.1 Learners' views about factors that contributes towards poor performance in Grade 12 Physical Science

Findings from the questionnaire to determine learners' views regarding factors that contribute towards poor performance are summarised below according to key themes:

Theme 1: Teaching, learning and assessment in Physical Science

This theme sought to find out the views of learners on issues related to their learning experiences in the school and classroom contexts. The results indicate that:

- Learners believe that the teaching methods used by Physical Science teachers make sense and it is easy for them to understand the content being taught;
- Learner involvement activities make learners better understand the Physical Science content;

- Learners mostly work independently in Physical Science task or activities;
- Learners do not have sufficient tasks and /or activities for Physical Science;
- Learners have limited and sometimes no revision material in preparation for formal assessments; and
- There is a lack of Physical Science teachers in some schools to conduct laboratory experiments.

Theme 2: Learner teacher support material

This theme sought to find out from learners their views regarding the availability and use of learner- and teacher support material in the learning and teaching of Physical Sciences in Grade 12. The results indicate that:

- There is a lack of suitable Physical Science textbooks;
- There is limited use of additional learner- and teacher support material, in cases a few are available;
- There is a lack of laboratories with chemicals and /or equipment; and
- In cases where laboratories are available, there is limited equipment to conduct the required experiments.

Theme3: Learner support

The questionnaire section for this theme meant to determine learners' views regarding the support from schools, homes and communities in the learning of Physical Sciences. The results indicate that:

- There are no extra-classes provided for learners;
- There is insufficient to no support from parents and /or guardians to learners who study Physical Sciences in Grade 12; and
- Schools are located further from towns where most teachers live, preventing them from offering after school support.

5.2.2 Teachers' views about factors that contribute towards poor performance in Grade 12 Physical Science.

The findings were analysed based on classroom practices as viewed by the teachers. Using qualitative techniques to learn teachers' views in this regard, the findings indicate the following overarching views:

- Overcrowded classrooms constrained both teaching and learning;
- Lack of group and practical work were observed during the teaching process.
- The use of 'question and answer' teaching methods by teachers in Physical Science were apparent;
- Insufficient informal practical tasks could be observed in Chemistry;
- Lack of individual attention per learner in Physical Science was a challenge;
- The use of the learners' home language by Physical Science learners and teachers can be beneficial; and
- Teacher's believed that a negative attitude towards Physical Science is caused by poor Physical Science background from the lower grades.

5.3 DISCUSSION OF FINDINGS

The discussion of the findings focussed on teachers' and learners' views about factors that contributed towards poor performance in Grade 12 Physical Science. Participants confirmed that the learners had a problem in using English as the medium of instruction. They were interested in using their mother tongue (isiZulu), but some of them have to code-switch to explain difficult terminology and Physical Science concepts. In the same vein, the use of isiZulu as a medium of instruction could benefit learners, since researchers have tested children who were taught in their mother tongue and found that they did better than those whose medium of instruction was a second language (Sultan, 2009:1). The education system had a challenge in the use of home language in Physical Science. There was no guarantee that learners can perform better, because there are some of the learners who failed to complete a simple sentence even in isiZulu.

All the participants believed that lack of support from home by parents and also lack of support from the district officials are contributory factors that resulted in low academic achievement in Physical Science. In rural schools the majority of parents are illiterate so they know nothing about Physical Science, to such an extent that they cannot check their children's work. Moreover, most of them are at work and some are working and living far away from their families. LaBahn (1995:1) says that schools must understand that lack of participation by parents do not necessary mean that they are neglecting their responsibilities, this simply means that they do not have resources or know-how to help their children.

The implication of this study is that the DoBE must come to the realisation that some schools do have some Physical Science apparatus or kits even if there is no laboratory. Teachers are not using equipment for effective teaching in some of the rural schools. Some of the resources are there, but Physical Science teachers failed to use them due to poor methodology of how to conduct practical work and inadequate experience in teaching Grade 12. Even if the required resources can be present in rural schools there is no guarantee that Physical Science results can be improved. Also, a large number of learners per classroom is not necessarily a constraint in Physical Science classes, even though numbers do have an influence, yet a larger number can contribute to an enriched learner view because of sharing of information in groups, however large number of learners seem to be a constraint to both teachers and learners in this study.

Attitude plays a major role in improving the performance of learners, according to Craker (2006:2). Expected achievement by learners is a factor that is heavily influenced by attitudes towards Physical Science. Also, a positive attitude towards Physical Science leads to better performance on achieving the measures of Physical Science capability if both learners and teachers agreed by saying that the learners' attitudes are positive towards the Physical Science subject. However, due the majority of the learners' reflections they seem to have a negative attitude towards the subject as they felt that Physical Science was too difficult with a demanding content, too many complex tasks were done and they were forced to do the subject. Over and above all of these contributing factors the question is: why are there still learners who are performing poorly in Physical Science? It appears that the teachers have

little knowledge about the Physical Science content or learners have a poor Physical Science background, because of neglect in the lower grades.

5.4 CONCLUSION

This study explored educators and learners' views about factors that contribute to poor performance of Grade 12 Physical Science in UMkhanyakude district of the KwaZulu Natal province. The findings of the research reveal the following factors are the major factors that contribute to secondary school learners' poor performance in Physical Science: overcrowded classrooms, lack of teacher knowledge, school management teams, parental and district support, lack of material resources, negative attitudes of learners towards Physical Science and the use of English as the medium of instruction.

5.5 RECOMMENDATIONS

The recommendations made below are based on the findings and implications of the findings of this study.

Overcrowded classrooms

- It is recommended that the School Management Teams (SMTs) should consider the policy of intake for learners based on the ratio of teachers and the size of the classroom.

Parental support

- It is recommended that parents should hire Physical Science tutors in order to help their children with their school homework. The teacher should ask for assistance and material as needed (Martin, Mullis, Gonzalez & Chrostowski, 2006: 357).

District officials and subject advisories

- It is recommended that the district team must have a monitoring programme for Physical Science per month; and

- There must be an allocation of subject advisors who can assist those struggling learners and teachers in clustering schools.

Lack of material resources

- It is recommended that the DoBE should deploy mobile laboratories and libraries in rural schools so that Physical Science learners can have access in the use of newly resources in time. The schools need well-equipped laboratories and internet facilities; Obamanu (2011) states that one of the factors related to under-achievement in Physical Science is the lack of appropriate laboratories.

Negative attitudes of learners towards Physical Science

- There must be a motivational programmes for learners who study Physical Science in each school; and
- The curriculum must shift from a teacher-centred education and must be more learner-centred based on practical work or current situations in the real world.

5.6 FURTHER RESEARCH

This study was conducted in five selected secondary schools in UMkhanyakude district. The findings are not generalisable to other schools and educational districts in the KwaZulu-Natal province. Therefore, there is a need to conduct similar studies in other educational districts of KwaZulu-Natal. The same study could be conducted in the GET Phase in order to promote the effective teaching and effective use of resources for Physical Science from lower grades in KwaZulu-Natal.

5.7 CHAPTER SUMMARY

In this chapter a summary of the findings was provided based on the research objectives which was to determine teachers' and learners' views on factors that contribute towards poor performance in Grade 12 Physical Science. The conclusions were drawn based on the findings and appropriate recommendations were provided.

The study reveals that Physical Science teaching in schools need much more attention and support from the DoBE.

REFERENCES

Abrahams, I. & Miller, R. (2008). Does practical work really work? A study of the effectiveness of practical work as a teaching and learning method in school science. *International Journal of Science Education,* 30(14): 1945-1969.

Aldous, C. (2004). Science and mathematics teachers' perceptions of C2005 in Mpumalanga secondary schools.*African Journal of Research in Science Mathematics Technology Education*, 8(1): 65-76.

Al Maghraby, A. & Alshami, M. (2013). Learning style and teaching methods preferences of Saudi Students of physical therapy. *Journal of Family and Community Medicine,* 20 (3): 192-197.

Baker, B.D., 2016. Does Money Matter In Education? , pp.1–44. Available at: http://www.jstor.org/stable/20142363 [Accessed April 9, 2018].

Baker, B.D., Sciarra, D.G. & Farrie, D., 2014. *Is school funding fair? A national Report card*, 3rd Edition: Education Law Center. Available at: https://files.eric.ed.gov/fulltext/ED570455.pdf. [Accessed April 9, 2018].

Barber, J. P. & Kelly, K. (2004). *Conscience and Critic: Peer Debriefing Strategies in Grounded Theory Research.* University of Michigan: Ann Arbor.

Beets, P. & Le Grange, L. (2005). "Africanising" assessment practices: Does the notion of ubuntu hold any promise? *South African Journal of Higher Education*, 19(5):15-25.

Bennett, J. (2003).*Teaching and Learning Science A Guide to Recent Research and its Applications.* New York: Continuum London.

Bernhard, J. (2003). *Physics Learning and microcomputer based Laboratory (MBL):* "Learning effects of using MBL as a technological and as a cognitive tool," in science

Education research in the knowledge based society, edited by D, Psillos*et al.,* (Kluwer, Dordrecht).
Bevins, S. Bryne, E. Brodie, M. & Price, G. (2011). English secondary school students' perceptions of school science and science and engineering. Science *Education International*, 22(4):255-265.

Bloch. (2008) .Building education beyond crisis. http://209.85.175.104/search/ cache:JLU89HY8pncJ:www.dbsa.org/Research/Document. [Accessed 12 August 2015].

Brown, P.L. & Friedrichsen, M. P. (2011). Teaching Bernoulli's principle through demonstrations. *Science Activities,* 48: 65-70.

Bubenzer, F. (2008). *Schooling system falling post-94 generation.* Accessed on August 2016 at [http://www.ijr.org.za/publications/archive/media-articles-and-programmes/fbsch. [Accesssed: 12 april, 2018].

Cameron, L. (2009). *Higher grade- Dinaledi schools initiative helps boost maths, science pass rates.* Engineering news, 29 (31) August 2009:1-104.

Campbell, J.R. & Vema, M.A. (2007). Effective parental influence: Academic home climate linked to children's achievements. *Educational Research and Evaluation*. 13(6), 501-519.

Cohen, R.M. (2002). School Our Teachers Deserve A proposal for Teacher-Centred Reform. Phil Delta kappan, 83(7), 2002: 532-537.

Conner, K.R. & Prahalad, C.K., 1996. A Resource-based Theory of the Firm: Knowledge Versus Opportunism. *Organization Sience*, 7(5), pp.478–501. Available at: http://eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?vid=0&sid=7f5685c6-fba2-4b40-b1c0-9a31e4764687%40pdc-v-sessmgr01 [Accessed April 9, 2018].

Craker, D. E. (2006). Attitudes toward science of students enrolled in introductory level Science Courses at UW-La Crosse. [Online] available at www.uwlax.edu/urc.

Darling-Hammond, L. (2002). *Teacher Quality and student achievement*: A review of state policy evidence. Education Policy Analysis Archives 8(1). [Available: http://olam.ed.asa.edu/epaa/v8n1.Accessed 07July 2017.

De Witt, M. & Lessing, A. (2007). The value of continuous professional development: Teachers perceptions. *The South African Journal of Education,* 27(1):53-67*.*

Department of Basic Education. (DOE). (2009). *Teacher-Learner ratio policy,* Polokwane, Limpopo Province.

Department of Basic Education. (2010). *Parental Involvement in Schools*, Polokwane, Limpopo Province.

Department of Basic Education. (2011). *Curriculum and Assessment Policy statement (CAPs).* Pretoria: Government Printer.

Department of Basic Education. (2012a). Improvement of Learner Performance: An Integrated Approach, Polokwane. Limpopo Province.

Department of Basic Education. (2012b). *Education Laws Amendments Act,* No 50 of 2002, Pretoria: Government Printer.

Department of Basic Education. (2012c). *Investigation into the Implementation of Maths, Science and Technology*, Pretoria: Government Printer.

Department of Basic Education. (2013). Assessment of Learners and the Role of Parents, Polokwane, Limpopo Province.

Department of Education. (2003). *National Curriculum Statement Grade 10-12(General) Mathematics.* Pretoria: Government Printer.

Department of Education. (2014). Results analysis speech by minister of basic education A. Motshekga, 6 January 2014.

http://www.southafrica.info/about/education/matric. [Accessed 06 October 2015].

Depoy, E., & Gitlin, L. (2011).*Introduction to Research understanding and applying Multiple Strategies* (4thed.). Philadelphia: Mosby.

De Vos, A.S., Strydom, H., Fouche`, C.B. & Delport, C.S.L. (2011).*Research at Grassroots*. (4thed.). Pretoria: Van Schaik.

Dhurumraj, T. (2013).*Contributory factors to poor learner performance in Physical Science in KwaZulu-Natal province with special reference to schools in the Pine town District*. Unpublished master thesis. University of South Africa: KwaZulu-Natal.

Einhorn, E. (2008). City short of Science teachers. Accessed 07 October 2015.

Fleisch, B., Taylor, N., Herholdt, R. &Sapire, I. (2011). Evaluation of Back to Basics Mathematics workbooks: A randomised control trial of Primary Maths Research Project .*South African Journal of Education,* 31(4):488-504.

Folashade, A. & Akinbobola, A. O. (2009). Constructivist problem based learning technique and the academic achievement of Physical students with low ability level in Nigeria Secondary Schools. *Eurasian Journal. Physical. Chemistry. Education,* 1(1):45-51.

Fonseca, J.M.B. & Conboy, J.E. (2006). Secondary student perceptions of factors effecting failure in science in Portugal. *Eurasia Journal of Mathematics, Science and Technology Education*, 2(2):82-95.

Gall, J. P., Gall, M. D., & Borg, W. R. (2009). *Applying Education Research: A practical guide.* New York: Longman.

Garcia, C. (2003). *The effect of teacher attitudes, experience, and background knowledge on the use of inquiry method teaching in the elementary classroom*. Unpublished Master thesis. University of Texas: Dallas.

Gill, P., Steward, K., Treasure, E., & Chadwick, B., (2008). *Methods of data collection in qualitative research*: interviews and focus groups. British Dental Journal, 204, 291-295.

Gopal, N. & Stears, M. (2007). An alternative approach to assessing science competencies. *African Journal Research in Science Mathematics Technology Education*, 11 (2):15-24.

Govender, P. (2009). Behind every good list, there lies a determined searcher. *The Sunday Times*, 18 October: 5.

Greenfield, P. M. (2004). *Weaving generations together: Evolving creativity in the Maya of Chiapas*. SantaFe. NM: School of American Research.

Grinnell, R.M. & Unrau, Y.A. (2005). Social Work Research and Evaluation: Quantitative and Qualitative Approaches. Oxford: Oxford University Press.

Grossman, P. & Thompson, C. (2008). Learning from curriculum materials: Scaffolds for new teachers? *Teaching and Teacher Education*.24: 2014 – 2026.

Hallam, S. & Cowan, R. (1999). Is homework important for increasing Educational Achievement? University of London: Institute of Education.

Hallam, S. (2004). Homework: The Evidence. London: Institute of Education.

Harland, T. (2002). Zoology students' experiences of collaborative enquiry in problem-based learning*. Teaching in Higher Education*, 7, 3-15.

Harris, D.N and Sass, T.R. (2007).*Teacher training, Teacher quality and Student achievement*: Calder Centre.

Henning, E., Van Rensburg, W. & Smith, B. (2004). *Finding your way in qualitative research.* Pretoria: Van Shaik.

Hill, L.H. (2014). Graduate students' perspectives on effective teaching. *Educational Studies and Research,* 25(2):57-65.

Hoepfl, M.C. (1997). Choosing qualitative research: A primer for technology education researchers. *Journal of Technology Education,* 9(1):47-63.

Howie, S.J. (2003). Language and other background factors affecting secondary pupils' performance in Mathematics in South Africa*. African Journal of Research in Science Mathematics Technology Education,* 7(1):1-20.

Howitt, D., & Cramer, D. (2010). *Introduction to Research Methods in Psychology.* 3rd edition, London: Prentice Hall.

Jackson, M.M. (2004). *Children's poor academic performance evokes parental homework assistance*: International *Journal of Behavioural Development*, 37(1):44-56.

Jacobs, M., Vakalisa, A. & Gawe, N. (2004). *Teaching-learning Dynamics*: *participative approach for OBE.* Cape Town: Heinemann.

James, A., Naidoo, J. & Benson, H. (2008, September). CASME'S *approach to the sustainability of science education in South Africa*. Unpublished dissertation paper presented at the X111 IOSTE Symposium, Turkey.

Johnson, B. & Christensen, L. (2004). *Educational Research: Quantitative, Qualitative and Mixed Approaches* (2nded.). Boston: Pearson.

Johnson, B. & Christensen, L. (2012).*Educational research: quantitative, qualitative, and mixed approaches*. (4th ed.). London: Sage.

Joubert, R. & Prinsloo, S. (2009). *The Law of Education in South Africa* (Second Edition). Cape Town: Van Schaik Publishers.

Kandjeo-Marenga, H. U. (2011). Teaching and Learning Implications on Group Experiments and Teacher Demonstrations to Teaching of Process Skills in Biology: A case two Namibian Schools. *Analytical Reports in International Education,* 4(1):43-66.

Kanyongo, G., Schreiber, J.B. & Brown, L. (2007). Factors affecting mathematics achievement among 6th graders in three sub-Sahara African countries: The use of hierarchical linear models (HLM). *African Journal Research in Science Mathematics Technology Education*, 11(1):37-46.

Kapenda, H.M. (2008). *Translating Policy into Practice: Aspects of Learner-Centred Classroom Practice in Mathematics in Namibia Secondary Schools.* Unpublished PhD thesis. University of Western Cape: Cape Town.

Khumalo, N. (2013). The Assessment of staff morale: an MEd, dissertation submitted to the University of Zululand. Republic of South Africa.

Khumalo, N.D.F. (2014). *Educators' Perceptions of Primary School Learners' Performance in MthunziniCircui*t. Unpublished master thesis. University of Zululand, Kwadlangezwa: KwaZulu-Natal.

Kilic, D. (2013). The effective of JIGSAW and group research techniques on democratic attitudes and academic achievements of prospective classroom teachers in educational science course. *International Journal of Academic Research,* 5(5):143-150.

Killen, R. (2013). *Teaching Strategies for Quality Teaching and Learning.* Somerset West: Beran Group.

Koshy, V. (2010). *Action Research for improving Educational Practice: A step-by step Guide*. Retrieved September 29, 2016, from http://www/wghdesign.html. Accessed 29 September 2016.

LaBahn, J. (1995). Education and Parental Involvement in Secondary Schools: Problems, Solutions, and Effects. [Online] available at htpp: //www.edpsycinteractive.org/files/parinvol.html. Accessed 11 November 2017.

Legotlo, M.W. Maaga, M.P. & Sebego, M.G. (2002). Perceptions of stakeholders on causes of poor performance in grade 12 in a province in South Africa. *South African Journal of Education*, 22(2):113-118.

Lemmer, E. & Ronald, A. (2006). *Contributory factors to poor performance in Physical Science in Grade 12 in the Further Education Training (FET),* Pretoria, South Africa.

Lessing, A. & de Witt, M. (2007). The value of continuous professional development: teachers' perceptions. *South African Journal of Education*, 27(1):53-67.

Lewin, K.M. & Stuart, J.S. (2003). *The Multi-Site Teacher Education, Research Project.* Mexico City. Harper Collins Publisher.

Lieberman, A. (2004). *Teacher Leadership*. California: Jossey-Bass.

Likoko, S. Mutsotso, S. & Nasongo, J. (2013). The adequacy of instructional materials and Physical facilities and their effect on quality of teacher preparation in emerging private primary teacher training colleges in Bungoma Country, Kenya. *International Journal of Science and Research (JJSR),* 2(1): 403-408.

Lolwana, P. (2004). What is the standard of the senior certificate examination? Umalusi report in context. Paper presented at the Human Sciences Research Council's (HSRC) matric colloquium, at the Sheraton Hotel, Pretoria.

Lui, A. (2012). Teaching in the zone: An introduction to working within the Zone of Proximal Development (ZPD) to drive effective early childhood instruction [White paper]. Retrieved April 2, 2018, from Google Scholar database: http://cluster.global2.vic.edu.au/files2018/02/zone-of-proximal-development-1kbnwld.pdf

Madibeng, T. (2006). Engineering education in SA- a failure or success? RACA Journal, 21(11). [http: //www. plumbingafrica.co.za/r&afeb2006education.htm] [Accessed 12 August 2015].

Mafukata, M.A. (2016). Complexities and constraints influencing learner performance in physical science. *International Journal of Research in Business and Social Science* 4(1):68-79.

Makgato, M. (2007). Factors associated with poor performance of learners in mathematics and physical science in secondary schools in Soshanguve, South Africa. *Educational Research*, 4(1):89-103.

Makgato, M., & Mji, A. (2006). Factors associated with high school learners' poor performance: a spotlight on mathematics and Physical science. *South African Journal of Education,* 26(2):253-266.

Martin, M.O., Mullis, I.V.S., Gonzalez, E.J., & Chrostowski, S.J. (2006*). International Association for the Evaluation of Educational Achievement.* Chestnut Hill, MA: TIMSS & PIRLS International Study Centre, Boston College.

Matjila, E. (2004). Over 15 000 grade 10 children have failed 2003 examination. htt:wwww.naminian.com.na./index.php. Accessed 13 July 2017.

Mattern, N. Schau, C. (2002). Gender differences in science attitude-achievement relationships over time among white middle-school students. *Journal Research Science Teaching*, 39(4):324-340.

McMillan, J.H., & Schumacher, S. (2006). *Research in education: A conceptual introduction.* New York: Longman.

Menekse, M., Stump, S. G., Krause, S. & Chi, H.T. (2013). Differentiated overt learning activities for effective instruction in engineering classrooms. *Journal of Engineering Education,* 102(3): 346-374.

Mji, A. & Makgato, M. (2006). Factors associated with high school learners' poor performance: a spotlight on mathematics and physical science. *South African Journal of Education, 26*(2): 253- 266.

Mkandawari, M. (2009). Physical Science Activities and Skills Development. In the school curriculum of Namibia. Unpublished master thesis. University of South Africa: South Africa.

Modisaotsile, M.B. (2012). The falling standard of basic education in South Africa. Africa Institute of South Africa press briefing no 72. UKZN.

Morrison, G. S. (2009). *Early childhood education today.* Pearson International Edition. Eleventh edition. New Jersey: Pearson.

Motshana, B. K. (2004). *Realising the objectives of the South African Schools*. Pretoria, South Africa.

Mouza, C., Marzocchi, A., Pan, Y.-C., & Pollock, L. (2016). Development, Implementation, and Outcomes of an Equitable Computer Science After-School Program: Findings From Middle-School Students. *Journal of Research on Technology in Education*, 48(2):84-104.

Muijs, D., & Reynolds, D. (2001). *Effective teaching*: Evidence and practice. London: Paul Chapman Publishing.

Muwanga-Zake, J.W. F. (2008). *Is science education in a crisis? Some problems in South Africa.* Science Education.
http://www.scienceinafrica.co.za/scicrisis.htm. [Accessed 20 August 2016].

Mwamwenda, T.S. (2004). *Educational psychology. An African-perspective.* Third Edition. South Africa: Heinemann.

Mwenda, E., Gitaari, E., Nyaga, G., Muthaa, G. & Reche, G. (2013). Factors contributing to students' poor performance in mathematics in public secondary schools in Tharaka South district Kenya*. Journal of Education and Practice,* 4(7): 93-99.

Nakanyala, J.M. (2015). Investigating factors affecting the effective teaching of grade 12 physical science in selected secondary schools in the Oshana educational region in Namibia. Unpublished master thesis. University of Nambia: Nambia.

National Council of Teachers of English (NCTE). (2012). *Statement on class size and teacher Workload: Secondary section.* Accessed 10 July 2016.

National Science Teachers Association (NSTA). (2007). NSTA Position Statement. *Principles of Professionalism for Science Educators*. Accessed 18 December 2017.

Ngema, M.H. (2016). *Factors that cause poor performance in science subject at Ingwavuma Circuit*. Unpublished master thesis. Univeristy of South Africa: KwaZulu-Natal.

O'Brien, T. (2011). *Even more brain-powered science: Teaching and learning with discrepant events*. Arlington: National Science Teachers Association.

Obomanu, B. J. (2011). Factors Related to Under Achievement in Science, Technology and Mathematics Education (STME) in Secondary Schools in Rivers State, Nigeria.

Okoye, N.S. (2002). *The Effect of Gender, Socio-economic Status and School Location on Students Performance in Nigerian Integrated Science*. Nigeria: Department of Science Education Delta State University.

Olivier, S. (2011). *High rates of grade 10 failures in Namibia.* Windhoek: Gamsberg.

Orlando. (2013). Nine Characteristics of Good Teacher. Philosophy of Teaching Retrieved online www.facultyfocus.com/articles/philosophy-of-teaching/nine-characteristics-of-agreater-teacher. [Accessed 9 January 2018].

Ornstein, A.C. & Hunkins, F.P. (2009).*Curriculum Foundations, Principles, and Issues*. New York: Pearson.

Parker, D. (2011). Enhancing Teacher Professionalism and Status: Commonwealth Presentation. United Kingdom. Commonwealth Secretariat.

Petty, G. (2009). *Evidence-Based Teaching*. A practical guide. Cheltenham: Nelson Thornes Ltd.

Powell, T.C., & Dent-Micallef, A. (1997). "Information system technology as competitive advantage: the role of human business and technology resources", *Strategic Management Journal,* 18(5):375-405.

Phurutse, M.C. (2005). *Factors affecting teaching and learning in South African public schools.* Cape Town: HSRC Press.

Reynolds, D. (2007). *Schools Learning from their Best:* The Within School Variation Project, Nottingham, NCSL.

Roach, R. (2005). Report: United State economic leadership vulnerable due to poor performance in math, science: Black Issues in Higher Education. [http://findarticles.com/p/articles/mim ODXK/15222/ain/3720081].Accessed 10 June 2015.

Rogan, J.M. & Grayson, D.J. (2003). Towards a theory of curriculum implementation with particular reference to science education in developing countries. *International Journal of Science Education,* 25(10)*:1171-1204.*

Ruby, A. (2006). *Improving science achievement at high - poverty urban middle schools*. USA: Wiley Periodicals. Inc.

Rudestam, K.E. & Newton, R.R. (2015). Surviving your dissertation: a comprehension guide to content and process. Thousand Oaks, California: Sage Publication.

Sax, L. J., Harper, C. E., & Wolf, D. S. (2012). *The Effects of Parental Involvement on the College Student Transition.* Glottolong 2.7 edited by Hammarstrom, Harald& Forkel. gitHub, 138.

Sekaran, U. (2003). Research methods for business: *A skill-building approach*. New York: John Wiley & Sons.

Shumba, O. (1999). *Critically interrogating the rationality of Western Science Vis-avis scientific literacy in non-western developing countries*. Department of Teacher Education, University of Zimbabwe, xxvi (1): 55-75.

Sultan, M. (2009). English as medium of instruction. Arab News.

Taylor, D.L. & Booth, S. (2015) Secondary Physical Science Teachers' Conceptions of Science Teaching in a Context of Change, *International Journal of Science Education,* 37:8, 1299-1320, DOI: 10.1080/09500693.2015.1035356

Trowbridge, L. S. Bybee, R. W. & Powell, J. C. (2004).*Teaching secondary school science. Strategies for developing scientific literacy.* Eight editions. New Jersey: Pearson.

UNESCO, International institute for Education Planning. (2007). *Supervision: a key component of quality monitoring system.* http://unesdoc. unesco.org /images /0021 /002159 /215928E.pdf. [Accessed 15 April 2016].

Veloso, L. & Marques, J.S., 2017. Designing science laboratories: learning environments, school architecture and teaching and learning models. *Learning*

Environments Research, 20(2), pp.221–248. Available at: http://link.springer.com/10.1007/s10984-017-9233-1 [Accessed November 14, 2017].

Vhurumuku, E. (2010). The Impact of Explicity Instruction on Undergraduate Students: Understandings of the Nature of Science. *African Journal of Research in MST Education,* 14(1):99-111.

Wilhelm, J., Baker, T. &Dube, J. (2001). *Strategic Reading.* Portsmouth, NH: Heinemann.

Woolfolk, A. (2010). *Educational Psychology*, Ohio State University. Emirald Group Publishing.

World Bank Working Paper.126/2008. (2008). Textbooks and school library provision in secondary education in Sub-Saharan Africa. The World Bank.

World Science Forum. (2007). *Investing in knowledge, investing in the future*. United State: Trans Tech Publication.

Worthen, B.R., Borg, W.R., & White, K.R. (1993). *Measurement and evaluation in the schools.* New York: Longman.

Yelkpieri, D., Namale, M., Esia-Dankoh, K. & Ofosu-Dwamena, E. (2012). *Effects of large class size on effective teaching and learning at the Winneba campus of the University of Education,* Winneba, Ghana US-China Education review A. 3: 319-332.

Yussuf, I. (2007). *Zanzibar minister decries poor science subjects' performance*. [http://www.ippmedia.com/ipp/guardian /2007. Accessed 17 June 2015.

Zumdahl, S.S. (2008). *Fundamentals of Chemistry* (Eight Edition) Houghton: Mifflin, Hascourt.

APPENDIX A: CONSENT FORMS

INFORMED CONSENT DECLARATION

(Parent or Guardian)

PROJECT TITLE: Educators' and learners' views about factors that contribute to poor performance of grade 12 Physical Sciences in UMkhanyakude District.

Mr Yanga Majamana from the University of Zululand, Faculty of Education Department of Curriculum and Instructional Studies has requested my permission to allow my child to participate in the above-mentioned research project. The nature and the 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:

The purpose of the research project is to understand the factors that contribute to poor performance of grade 12 Physical Sciences in UMkhanyakude District. You should please take note of the following:

1. The University of Zululand has given ethical clearance to this research project and I have seen/ may request to see the clearance certificate;
2. By participating in this research project my child will be contributing towards developing policy recommendations that may benefit all stakeholders concerned;
3. My child will participate in the project by completing a questionnaire without prejudice;
4. His/her participation is entirely voluntary;
5. If he/she at any stage wishes to withdraw from participating further, he/she may do so without any negative consequences;
6. He/she can withdraw at any time from the project before the project is finished, if he/she decides to do so;
7. My child and I will not be compensated for participating in the research, but his/her additional expenses will be reimbursed;
8. I understand that the foreseeable risks associated with this study are minimal. These risks are similar to those associated with the disclosure of work related information of others. The researcher has assured me of confidentiality and anonymity in regard to the dissemination of any information to others;
9. The researcher intends publishing the research results in the form of a dissertation, however, confidentiality and anonymity of records will be maintained and that my name and identity will not be revealed to anyone who has not been involved in the conduct of the research;

10. I will appreciate to receive feedback regarding the results obtained during the study by reading the published research document;
11. Any further questions that I might have concerning the research or my participation will be answered by Mr Y. Majamana on the following mobile number and email: 0783007129 or email: *ymajamana@webmail.co.za;*
12. By signing this informed consent declaration I am not waiving any legal claims, rights or remedies;
13. 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 pressurised in any way and I voluntarily agree to participate in the above-mentioned project. By signing this form I give permission for my child (name) ……...age…….to participate in the research project.

_____ _____

Parent / Guardian signature Date

INCWADI EVEZA IGUNYA LOMZALI UKUTHI UMNTWANA ABAMBE IQHAZA OCWANINGWENI (Umzali noma onegunya lokunakekela umntwana)

Isihloko: **Imibono yothisha kanye nabafundi ngezinto ezinomuthelela ekungenzeni kahle kwabafundi bebanga leshumi nambini esifundweni se-Physical Sciences (sobuchwephesha) kwisifundazwe sase Mkhanyakude.**

Umcwaningi: Mr.Majamana Yanga

isikhungo: University of Zululand

Uphiko: Department of Curriculum and Instructional Studies

Lona obhalwe ngenhla ofunda eUniversity of Zululand ufaka isicelo sokuba umntwana ahlanganyele ocwaningweni olwenziwayo olumayelana nesihloko esibhalwe ngenhla.

Ngichazelekile ngenhloso yalolu cwaningo nangenhloso yokusayina lelifomu ngolimu engiluqondayo.

Ngiyaqonda ukuthi:

1. Inhloso yalolucwaningo:imibono yothisha nabafundi engasiza abafundi bebanga leshumi nambili ukuze bakwazi ukwenza ngcono.

2. I-University of Zululand iluvumele lolu cwaningo.

3. Ngokuzibandakanya nalo lucwaningo umntwana wami angasiza ekwakhiweni kwemibono ezosiza othisha naba fundi bebanga leshumi nambini ukuze bakwazi ukwenza ngcono kwisi fundo se-Physical Sciences (sobuchwephesha).

4. Umntwanawam uzozibandakanya kulolu cwaningo ngokuphendula imibuzo efuna ulwazi ngesihloko esibhalwe ngenhla, nokubamba iqhaza ekungenzeni kahle kwabafundi bebanga leshumi nambini.

5. Umntwana wami uzivumele yena ukuba ingxenye yalolu cwaningo futhi uneminyaka engaphezu kweyisikhombisa.

6. Uma engasathandi ukuba ingxenye yalo, uyohoxa engalindele izinkinga ngokuhoxa kwakhe.

7. Umntwana wami angacelwa ukuthi ahoxe ngaphambi kokuphela kocwaningo uma umcwaningi noma ubani omunye ophathelene nalo ebona kufanele.

8. Mina nomntwana wami asilindele kuhola ngokuba kulolu cwaningo.

9. Angilindele bungozi obungahambisana nalolu cwaningo, kodwa uma imibuzo ngandlela thize iphazamisa umoya womntwana wami, umncwaningi ukulungiselele lokho ngokusebenzisana nabaluleki abazoba kanye naye ngesikhathi socwaningo.

10. Umcwaningi uyolishicilela lolucwaningo lube umqingo wencwadi eqikelela ukuthi igama lomntwana wami, nemininingwane yakhe kuyohlala kuyimfihlo.

11. Ngingathanda ukuzwa ngemiphumela yocwaningo ngokufunda lowo mqingo oshicilelwe.

12. Imibuzo engingabanayo mayelana nalolu cwaningo iyophendulwa umcwaningi uqobo.

13. Ngokuzinikela kwami ekusayineni leli fomu angizibophezeli ekutheni ngingethathe izinyathelo okungaba ezomthetho noma ukunxeshezelwa komntwana wami.

14. Ngizogcina ikhophi yaleli fomu lokuzibophezela

Mina.....ngiyavuma ukuthi ngiyifundile yonke imininingwane ekulelifomu futhi ngichazelwe yona ngolimi engiluqondayo.Ngiyakuqonda okubhalwe kulelifomu. Ngibuze yonke imibuzo ebengingabanayo ngaphenduleka ngendlela engenelisayo. Ngiyakuqonda konke okulindeleke kimi ngalolu cwaningo.

Angifakwanga ingcindezi, ngizingenele mina ngokuthanda kulolu cwaningo. Ngokusayina ngiyazivumela mina ukuthi umntwana wami u.....oneminyaka eyi.....angazimbandakanya nalolu cwaningo.

Ukusayina.....
Usuku.....

PARTICIPANT INFORMED CONSENT DECLARATION

INFORMED CONSENT DECLARATION
(Participant-Educator)

Project Title: Educators' and learners' views about factors that contribute to poor performance of grade 12 Physical Sciences in UMkhanyakude District.

The researcher is registered for the Master of Education (M.Ed.) degree at the University of Zululand, Department of Curriculum and Instructional Studies.

The nature and the 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 understand the factors that contribute to poor performance of grade 12 Physical Sciences in UMkhanyakude District;

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 the improvement of the teaching and learning of Physical Sciences in grade 12;

4. I will participate in the project by participating in a semi-structured interview related to the factors that contribute to poor performance of grade 12 Physical Sciences in my school;

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: information disclosure and identification of the participants;
b. the following steps have been taken to prevent the risks: consideration of ethical issues;
c. there is no chance of any risk materialising;

8. The researcher intends publishing the research results in the form of journal article and forwarding them to the Department of Basic Education. 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 the research;

9. I will receive feedback in the form of empirical findings and access to the copy of this report 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 Mr Y. Majamana on the following mobile number and email: *0783007129* or email: *ymajamana@webmail.co.za;*

11. By signing this informed consent declaration I am not waiving any legal claims, 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 pressurised in any way and I voluntarily agree to participate in the above-mentioned project.

……. …….
Participant's signature **Date**

APPENDIX B: LETTER SEEKING FOR PERMISSION TO CONDUCT RESEARCH

University of Zululand
Faculty of education
Private Bag X1001
KwaDlangezwa
Empangeni 3886
15 March 2016

The Circuit Manager
Department Of Basic Education
UMkhanyakude District
Mtubatuba
3935

Dear Sir/Madam

REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN SCHOOLS

I am employed by the Department of Basic Education and I am currently teaching at Ikusasalethu Secondary school. I am currently registered for a Master of Education degree (M.Ed.) at the University of Zululand within the department of Curriculum and Instructional Studies. The topic of my research project is**:** *Educators' and learners' views about factors that contribute to poor performance of Grade 12 Physical Sciences in UMkhanyakude District.*

I wish to seek permission to conduct research in schools under UMkhanyakude district in the Kwasane circuit. The educators that teach Physical Sciences in Grade 12 and the learners that do Physical Sciences as a subject in Grade 12 will be used as participants to collect data for the study. The researcher will interview two educators teaching Physical Sciences in Grade 12 and learners from the Grade 12 Physical Sciences class will complete a questionnaire from the 5 sampled schools. The researcher will seek permission from the principal, then schedule an appointment with the two educators and conduct the interviews during their lunch breaks and after school, so that not to disturb the functionality of the school. With regard to the Grade 12 learners, they will be given a questionnaire and necessary

arrangements will be made with the Head of Department of Physical Sciences to collect the questionnaires a week later.

I hope the findings of this study will benefit and assist the Department of Basic Education and educators teaching in Physical Sciences in Grade 12.

Yours faithfully

Mr Y. Majamana

Contact numbers: 0737474469 (mobile)

035 5509707 (w)

Email: ymajamana@webmail.co.za

Dr S. Govender (Supervisor)

Ms N. Maluleke (Co-Supervisor)

LETTER TO THE PRINCIPAL

University of Zululand
Faculty of education
Private Bag X1001
KwaDlangezwa
Empangeni
3886
15 March 2016

The Principal

Dear Sir/Madam

REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN GRADE 12

I am employed by the Department of Basic Education and I am currently teaching at Ikusasalethu Secondary school. I am currently registered for a Master of Education degree (M.Ed.) at the University of Zululand within the department of Curriculum and Instructional Studies. The topic of my research project is**:** *Educators' and learners' views about factors that contribute to poor performance of grade 12 Physical Sciences in UMkhanyakude District.*

I wish to seek permission to conduct research in your school. The educators that teach Physical Sciences in grade 12 and the learners that do Physical Sciences as a subject in grade 12 will be used as participants to collect data for the study. The researcher requests to interview two educators teaching Physical Sciences in Grade 12 and learners from the grade 12 Physical Sciences class will complete a questionnaire.

The researcher will schedule an appointment with the two educators and conduct the interviews during their lunch breaks and after school. With regard to the Grade 12 learners, they will be given a questionnaire and necessary arrangements will be made with the Head of Department of Physical Sciences to collect the questionnaires a week later.

I hope the findings of this study will benefit and assist the Department of Basic Education and educators teaching in Physical Sciences in Grade 12.

Yours faithfully

Mr Y. Majamana

Contact numbers: 0737474469 (mobile)

035 5509707 (w)

Email: ymajamana@webmail.co.za

Dr S. Govender (Supervisor)

Ms N. Maluleke (Co-Supervisor)

APPENDIX C: LETTER GRANTING PERMISSION TO CONDUCT RESEARCH

education

Department:
Education
PROVINCE OF KWAZULU-NATAL

Enquiries: Phindile Duma Tel: 033 392 1004 Ref.:2/4/8/773

Mr Y Majamana
PO Box 815
Mtubatuba
3935

Dear Mr Majamana

PERMISSION TO CONDUCT RESEARCH IN THE KZN DoE INSTITUTIONS

Your application to conduct research entitled: **"EDUCATORS AND LEARNERS VIEWS ABOUT THE FACTORS THAT CONTRIBUTE TO POOR PERFORMANCE OF GRADE 12 PHYSICAL SCIENCES IN UMKHANYAKUDE DISTRICT"**, in the KwaZulu-Natal Department of Education Institutions has been approved. The conditions of the approval are as follows:

1. The researcher will make all the arrangements concerning the research and interviews.
2. The researcher must ensure that Educator and learning programmes are not interrupted.
3. Interviews are not conducted during the time of writing examinations in schools.
4. Learners, Educators, Schools and Institutions are not identifiable in any way from the results of the research.
5. A copy of this letter is submitted to District Managers, Principals and Heads of Institutions where the Intended research and interviews are to be conducted.
6. The period of investigation is limited to the period from 19 April 2016 to 30 June 2017.
7. Your research and interviews will be limited to the schools you have proposed and approved by the Head of Department. Please note that Principals, Educators, Departmental Officials and Learners are under no obligation to participate or assist you in your investigation.
8. Should you wish to extend the period of your survey at the school(s), please contact Miss Connie Kehologile at the contact numbers below
9. Upon completion of the research, a brief summary of the findings, recommendations or a full report / dissertation / thesis must be submitted to the research office of the Department. Please address it to The Office of the HOD, Private Bag X9137, Pietermaritzburg, 3200.
10. Please note that your research and interviews will be limited to schools and institutions in KwaZulu-Natal Department of Education.

UMkhanyakude District

Nkosinathi S.P. Sishi, PhD
Head of Department: Education
Date: 19 April 2016

KWAZULU-NATAL DEPARTMENT OF EDUCATION

POSTAL: Private Bag X 9137, Pietermaritzburg, 3200, KwaZulu-Natal, Republic of South Africa
PHYSICAL: 247 Burger Street, Anton Lembede House, Pietermaritzburg, 3201. Tel. 033 392 1004
EMAIL ADDRESS: kehologile.connie@kzndoe.gov.za / Phindile.Duma@kzndoe.gov.za
CALL CENTRE: 0860 596 363; Fax: 033 392 1203 WEBSITE: WWW.kzneducation.gov.za

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

APPENDIX D: QUESTIONNAIRE

QUESTIONAIRE (INHLOLOMBUZO)

TO BE ANSWERED BY LEARNER'S DOING PHYSICAL SCIENCES AS A SUBJECT IN GRADE 12.

IZOPHENDULWA UMFUNDI OWENZA ISIFUNDO SESAYENSI EBANGENI LESHUMI NAMBINI.

DEAR LEARNER SAWUBONA MFUNDI

1. Please complete the following questions as accurately as possible. Uyacelwa ukuba ugcwalise izikhala zemibuzo ngokukhulu ukucophelela.
2. Indicate your answer by means of a cross (x) in the appropriate space or block. Faka isiphambano esikhaleni esifanele ukukhombisa impendulo oyikhethile.
3. Kindly complete the blank space provided for the opened-ended questions and explains your answer.Uyacelwa ukuba ugcwalise izikhala ezingabhaliwe ukuphendula imibuzo evulekile bese unikeza nencazelo yempendulo yakho.
4. Please remember that all information you provide will be kept confidential, therefore do not write your name or name of your school on this questionnaire. Uyacelwa ukuba ukhumbule ukuthi lonke ulwazi ozolunikeza luzogcinwa luyimfihlo, ngakho – ke ungabhali igama lakho noma igama lesikole sakho kulolu cwaningo.

Thank you for your cooperation.

Ngiyabonga ukuhlanganyela nathi.

Mr. Y. Majamana (M. Ed Student)

Faculty of Education

Department of Curriculum and Instructional Studies

University of Zululand

Private Bag X 1001

KwaDlangezwa

3886

SIGNATURE/ UKUSAYINA

Close ended questions (Imibuzo evalekile)

TEACHING, LEARNING AND ASSESSMENT IN PHYSICAL SCIENCES. **UKUHLOLWA UKUFUNDA NOKUFUNDISA KWESIFUNDO SESAYENSI.**	***STRONGLY AGREE*** ***Ngiyavuma kakhulu 4***	***AGREE*** ***Ngiyavuma 3***	***DISAGREE*** ***Angivumi 2***	***STRONGLY DISAGREE*** ***Angivumelani kakhulu 1***
1. My teacher teaches Physical Sciences in a way that makes sense and it is easy for me to understand the content being taught. Uthisha wami ufundisa isifundo seSayensi ngendlels eyakha umqondo futhi kwenza kube lula ukuqonda ingqikithi yokufundiswayo.				
2. My teacher allows me to participate in activities during Physical Sciences. Uthisha wami uyangivumela ukuba ngibambe iqhaza ngesikhathi sokufundiswa kwe Sayensi.				
3. My teacher allows us to work in groups during lessons. Uthisha wami uyasivumela sisebenze ngamaqoqo kulesi sifundo.				
4. My teacher allows me to do some class activities on my own. Uthisha wami uyangivumela ngenze eminye yemisebenzi ngizimele ngedwa.				
5. My teacher gives us tests, class work, class activities regularly and gives us feedback as soon as possible. Uthisha wami uyasinika njalo izivivinyo, imisebenzi yaseklasini, uphinde asinike nobekulindelekile ngokushesha.				
6. My teacher gives us previous question papers and memoranda, and work books for revision. Uthisha wami uyasinikeza imibuzo nezimpendulo zeminyaka edlule ukuze sibuyekeze.				
7. My teacher conducts experiments in the laboratory with us. Uthisha wami uqhuma ucwaningo endlini yokucwaninga kanye nathi.				

SECTION B (ISIQHEPHU SESIBILI)

SECTION B (ISIQHEPHU SESIBILI)

Open ended question (imibuzo evulelekile)

8. Do you think the number of learners in your class (class size) affects your performance in Physical Sciences? (Yes/No). PLEASE Explain:
   Ucabanga ukuthi isibalo sezingane egumbini lakho lokufundela ziyayiphazamisa imiphumela yeSayensi? (Yebo noma Cha) NGICELA Uchaza:

9. What kind of experiments have you done in class or laboratory this year? Please list three (3).
   Hlobo luni locwaningo olwenzile ekilasini noma endlini yokusebenzela ososayensi. Bala kube kuthathu (3).

   1.
   2.
   3.

10. Please explain what you had to do in ONE of the experiments above.
    Ngicela uchaze ukuthi yini ongayenza koku kodwa kulolu cwaningo olungenhla.

11. If Physical Science was to be taught in your home language, would you have a better understanding of the subject? Do you think your results would improve? PLEASE Explain.
    Uma iSayensi ingafundiswa ngolimi lwasekhaya lwakho ubungasiqondisisa yini lesi sifundo? Ucabanga ukuthi imiphumela ibingabangcino? Ngicela uchaze.

SECTION C (ISIQEPHU SESITHATHU)

Closed ended questions(**imibuzo evalelekile**)

LEARNER TEACHER SUPPORT MATERIAL IMPAHLA YOKWESEKA UMFUNDI NOMFUNDISI	*STRONGLY AGREE* *Ngiyavuma kakhulu* *4*	*AGREE* *Ngiyavuma* *3*	*DISAGREE* *Angivumi* *2*	*STRONGLY DISAGREE* *Angivumelani kakhulu* *1*
12. My teacher gives us a suitable textbook for Physical Sciences because, I can read the textbook and understand on my own. Isikole sami siyanginikeza izincwa ezifanelekile ngoba ngoba ngingazifunda ngiziqonde ngokwami.				
13. My teacher sometimes brings items from home or elsewhere to make sure that we learn better in Physical Sciences. Kwesinye isikhathi uthisha wami uyaletha izinto asuka nazo ekhaya noma kwenye indawo ukwenza isiqiniseko ukuthi sifunda kangcono iSayensi.				
14. Our school has a laboratory and we use it to do practical experiments. Isikolo sethu sinayo indlu yokucwaninga futhi siyisebenzisela ukucwaninga ngezinto ezithintekayo.				
15. Our school laboratory has all the equipment to conduct all practical experiments for our grade 12 Physical Sciences syllabi. Isikole sami sinayo yonke into yokwenza ucwaningo ebangeni leshumi nambili.				
16. Our school has a laboratory but with few equipment, so we cannot do all practical experiments for our grade 12 Physical Sciences syllabi. Isikole sethu sinayo indlu yokucwaningela enezinto ezincane/ezingenele, ngakho asikwazi ukwenza lonke ucwaningo kanye nabebanga le–12 abenza isifundo seSayensi.				

17. Our school has no laboratory and we cannot do any practical experiments for our grade 12 Physical Sciences syllabi. Isikole sethu asinayo indlu yokwenza ucwaningo futhi ngeke sikwazi ukwenza ucwaningo				
18. Availability of resources in my school affects my performance in Physical Sciences in a negative way. E.g. textbooks and laboratories. Ukuba khona kwezinsiza esikoleni sami kunganginika imiphumela emihle kuyiSayensi ngendlela enhle. Isibonelo. Izincwadi zokufunda kanye nendlu yokucwaningela.				
19. Unavailable of resources in my school affects my performance in Physical Sciences in a negative way. E.g. textbooks and laboratories. Ukungabikho kwezinsiza esikoleni sami kungathikameza impumelelo yami kuyiSayensi ngendlela embi. Isibonelo. Izincwadi zokufunda kanye nendlu yokucwaningela.				
20. My school provides extra classes for Physical Sciences during the week day, afternoons, weekends and holidays. Isikole sami siyasihlinzeka ngezifundo ezengeziwe ntambama, ngempelaviki kanye nagamaholidi.				
21. One of my family members helps me with Physical Sciences homework's and other activities. Oyedwa womndeni wami uyangisiza kuyiSayensi ngomsebenzi wasekhaya nakweminye imisebenzi.				

SECTION D (ISIQEPHU SESINE)

Open ended questions (imibuzo evulelekile)

22. How much time do you spend each day reading, completing practice exercises and studying for Physical Sciences? PLEASE Explain.
Singakanani isikhathi osichitha ngosuku ufunda, ubukeza, uqeda ucwaningo futhi wenza izifundo zeSayensi? NGICELA Uchaza.

23. Do you enjoy doing Physical Sciences as a subject? (Yes/No). PLEASE Explain.
Uyakujabulela yini ukwenza iSayensi njengesifundo? Yebo noma Cha. NGICELA uchaze.

24. Do you face any challenges in Physical Sciences? (Yes/ No). Please explain.
Uke wabhekana nezinkinga izinqinamba ngeSayenzi. (Yebo noma Cha). Ngicela uchaze.

APPENDIX E: INTERVIEW SCHEDULE

INTERVIEW: EDUCATOR

SECTION A

BIOGRAPHICAL INFORMATION

1. State your years of overall teaching experience.

   ---

2. How many years have you taught Grade 12 Physical Sciences?

   ---

3. Is your qualification suitable for teaching Physical Sciences? (Specialization in Physical Sciences) Explain.

SECTION B

CLASSROOM PRACTICE

1. What are the challenges that you are faced with in your school with regards to the teaching of Physical Sciences in grade 12?

---

2. In your class are there learners who do very well in Physical Science and other learners who do not do so well? What do you think brings about this difference in performance?

---

3. What kind of support and assistance do you offer to those learners who are struggling to cope with Physical Sciences in the classroom? Explain.

---

4. Are you able to reflect whether your teaching methodologies have resulted in an improvement of teaching and learning of Physical Sciences in the classroom? Explain.

---

5. Does the availability of learner, teacher support material and infrastructure affect your teaching strategies that you use in the classroom? Briefly explain.

---

6. Does the geographical location of your school affect the teaching and learning of Physical Science? Briefly explain.

---

7. If Physical Sciences were to be taught in the learners' home language, would they have a better understanding of the subject and do you think their results would improve?

ASSESSMENT

8. Which section of the exam do you think most of the learners experience much difficulty in Paper 1 (Physical Science) or Paper 2 (Physical Chemistry) and why do you think this prevails?

---

9. Briefly explain the measures you have put in place to help reduce the failure rate in Physical Science Examinations in your school?

SUPPORT AND DEVELOPMENT

10. How often have Subject advisors/specialists, Circuit and District officials visited your school/s and how have they assisted with the teaching of Physical Sciences?

---

11. What kind of support, assistance and guidance has been provided by Subject advisors/specialists, Circuit and District officials and the Staff Management Team in schools regarding the teaching of Physical Sciences? (more especially under UMkhanyakude district)

---

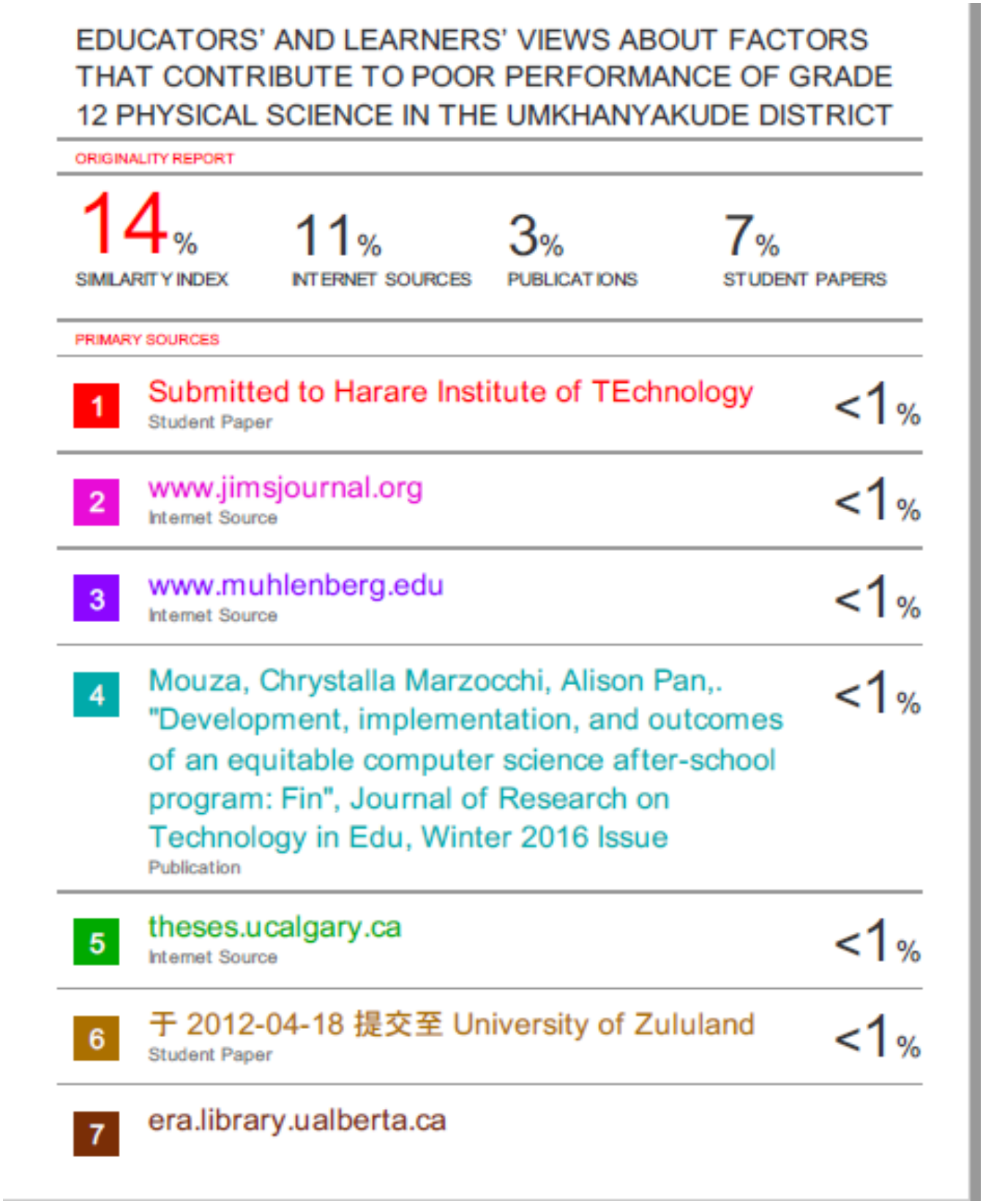
12. What professional development programmes are in place in your school to assist educators to overcome challenges of teaching and learning of Physical Sciences?

---

13. Can you suggest turnaround strategies that you think the Department of Basic Education can adopt in order to improve the performance of Physical Sciences?

NB: ADDITIONAL COMMENTS/SUGGESTIONS

APPENDIX F: PLAGIARISM REPORT



EDUCATORS' AND LEARNERS' VIEWS ABOUT FACTORS THAT CONTRIBUTE TO POOR PERFORMANCE OF GRADE 12 PHYSICAL SCIENCE IN THE UMKHANYAKUDE DISTRICT

ORIGINALITY REPORT

14%	11%	3%	7%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Harare Institute of TEchnology Student Paper	<1%
2	www.jimsjournal.org Internet Source	<1%
3	www.muhlenberg.edu Internet Source	<1%
4	Mouza, Chrystalla Marzocchi, Alison Pan,. "Development, implementation, and outcomes of an equitable computer science after-school program: Fin", Journal of Research on Technology in Edu, Winter 2016 Issue Publication	<1%
5	theses.ucalgary.ca Internet Source	<1%
6	于 2012-04-18 提交至 University of Zululand Student Paper	<1%
7	era.library.ualberta.ca	

	Internet Source	<1%
8	Kilic, Durmus. "THE EFFECTS OF JIGSAW AND GROUP RESEARCH TECHNIQUES ON DEMOCRATIC ATTITUDES AND ACADEMIC ACHIEVEMENTS OF PROSPECTIVE CLASSROOM TEACHERS IN EDUCATIONAL SCIENCE COURSE", International Journal of Academic Research, 2013. Publication	<1%
9	www.goutiegeniaal.co.za Internet Source	<1%
10	unesdoc.unesco.org Internet Source	<1%
11	www.ru.ac.za Internet Source	<1%
12	Submitted to University of Melbourne Student Paper	<1%
13	www.zenexfoundation.org.za Internet Source	<1%
14	www.dspace.up.ac.za Internet Source	<1%
15	Submitted to Pace University Student Paper	<1%

APPENDIX G: ETHICAL CLEARANCE CERTIFICATE

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 6887
Fax: 035 902 6222
Email: ManqeleS@unizulu.ac.za

ETHICAL CLEARANCE CERTIFICATE

Certificate Number	**UZREC 171110-030 PGM 2016/291**							
Project Title	**Educators and learners views about factors that contribute to poor performance of Grade 12 Physical Sciences in uMkhanyakude District**							
Principal Researcher/ Investigator	Y Majamana							
Supervisor and Co-supervisor	Dr SA Govender		Ms N Maluleke					
Department	Curriculum and Instructional Studies							
Nature of Project	Honours/4th Year		Master's	x	Doctoral		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 proposal and the documents listed on page 2 of this Certificate.

Special conditions:

(1) This certificate is valid for 2 years from the date of issue.
(2) Principal researcher must provide an annual report to the UZREC in the prescribed format [due date-31 July 2017]
(3) Principal researcher must submit a report at the end of project in respect of ethical compliance.

The Researcher may therefore commence with the research as from the date of this Certificate, using the reference number indicated above, but may not conduct any data collection using research instruments that are yet to be approved.

Please note that the UZREC must be informed immediately of

- Any material change in the conditions or undertakings mentioned in the documents that were presented to the UZREC
- Any material breaches of ethical undertakings or events that impact upon the ethical conduct of the research

Classification:

Data collection	Animals	Human Health	Children	Vulnerable pp.	Other
X					
Low Risk		Medium Risk		High Risk	
		X			

The table below indicates which documents the UZREC considered in granting this Certificate and which documents, if any, still require ethical clearance. (Please note that this is not a closed list and should new instruments be developed, these would require approval.)

Documents	Considered	To be submitted	Not required
Faculty Research Ethics Committee recommendation	X		
Animal Research Ethics Committee recommendation			X
Health Research Ethics Committee recommendation			X
Ethical clearance application form	X		
Project registration proposal	X		
Informed consent from participants	X		
Informed consent from parent/guardian			X
Permission for access to sites/information/participants	X		
Permission to use documents/copyright clearance			X
Data collection/survey instrument/questionnaire	X		
Data collection instrument in appropriate language		Only if necessary	
Other data collection instruments		Only if used	

The UZREC retains the right to

- Withdraw or amend this Certificate if
  - Any unethical principles or practices are revealed or suspected
  - Relevant information has been withheld or misrepresented
  - Regulatory changes of whatsoever nature so require
  - The conditions contained in this Certificate have not been adhered to

- Request access to any

The UZREC wishes the researcher well in conducting the research

Professor Nokuthula Kunene
Chairperson: University Research Ethics Committee
04 August 2016

Y Majamana - PGM 2016/291

Pa

CHAIRPERSON
UNIVERSITY OF ZULULAND RESEARCH
ETHICS COMMITTEE (UZREC)
REG NO: UZREC 171110-30
04 -08- 2016
RESEARCH & INNOVATION OFFICE

APPENDIX H: CONFIRMATION OF PROJECT REGISTRATION

UNIVERSITY OF ZULULAND
HIGHER DEGREES COMMITTEE

RESEARCH & INNOVATION
Website: http://www.unizulu.ac.za
Private Bag X1001
KwaDlangezwa 3886
Tel: 035 902 6887
Fax: 035 902 6222
Email: ManqeleS@unizulu.ac.za

Confirmation of Project Registration

Registration Number	S531/16							
Project Title	*Educators' and learners' views about factors that contribute to poor performance of grade12 Physical Sciences in uMkhanyakude district*							
Principal Researcher/ Investigator	Majamana Y							
Student number	201330277							
Supervisor and Co-supervisor	Dr S Govender				Ms N Maluleke			
Department	Curriculum and Instructional Studies							
Nature of Project	Honours/4th Year		Master's	x	Doctoral		Departmental	

Dear Student

I have the pleasure of informing you that the Higher Degrees Committee, at its meeting held on 20 May 2016, approved your research proposal.

Please note: Your proposal can now be considered for ethical clearance after which you can apply for research funding. Kindly provide this letter with your ethical clearance certificate when submitting your final thesis for external examination.

Yours sincerely,

Mr. Siyanda Manqele
Post-graduate Studies
21 June 2016

UNIVERSITY OF ZULULAND
RESEARCH & INNOVATION OFFICE
21 JUN 2016
STAMP
POSTGRADUATE STUDIES
RECEIVED:

Majamana Y S531/16