INVESTIGATING FACTORS AFFECTING THE EFFECTIVE TEACHING OF GRADE 12 PHYSICAL SCIENCE IN SELECTED SECONDARY SCHOOLS IN THE OSHANA EDUCATIONAL REGION IN NAMIBIA

A THESIS SUBMITTED IN PARTIAL FULFILMENT

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BY

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APPROVAL PAGE

This research has been examined and is approved as meeting the required standards for partial fulfilment of the requirements of the Master of Education Degree.

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External Examiner Date

DECLARATION

I, Johannes M. Nakanyala, hereby declare that this thesis: *Investigating factors affecting the effective teaching of Grade 12 Physical Science in selected secondary schools in the Oshana Educational Region* in Namibia is a true reflection of my own research, and that this work, or part thereof has not been submitted for a degree in any other institution of higher education.

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Johannes M. Nakanyala Date

DEDICATION

This thesis is dedicated to my entire family, for their patience, love, support and encouragement that they offered me during the time that I was carrying out this study. Furthermore, I would like to dedicate this thesis to our dear beloved mother, the late Monica Sakeus-Nakanyala, for giving us the best education of good behaviour in and out of the house, as well as teaching us the norms and values of our society.

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ABSTRACT

This study investigated the factors affecting the effective teaching of Physical Science in the Oshana Educational Region. The objectives of the study were: (a) to determine the views of teachers, school principals and the advisory teacher on the factors affecting the effective teaching of Grade 12 Physical Science; (b) to find out to what extent Grade 12 Physical Science teachers use effective teaching methods in their teaching; (c) to suggest strategies which can be implemented to improve the teaching of Physical Science.

The study employed a mixed methods approach to generate both quantitative and qualitative data in two main sequential phases and lesson observations were meant to help augment data from the two phases. In the first phase, quantitative data was collected by means of closed-ended questionnaires from 14 Grade 12 Physical Science teachers, eight school principals in the selected secondary schools and the advisory teacher in the Oshana Educational Region. The data from the first phase were then analysed and used to formulate questions for phase two, the semi-structured interviews which helped to give more information on the statistical data from phase one. Five of the 14 Grade 12 Physical Science teachers, plus the advisory teacher, participated in the interviews. Lesson observations were also conducted as a way to collate and corroborate data from the two phases as well to triangulate data. Five teachers who participated in the interviews were also observed teaching Grade 12 Physical Science. Descriptive statistics were used to analyse the quantitative data, while the content analysis method was used to analyse the qualitative data.

The study revealed that the Grade 12 Physical Science teachers who participated in this study used the lecture method more often in their teaching. It also found that teachers rarely used teaching methods such as group work, problem-based learning, and practical work in teaching the Grade 12 Physical Science to learners. In addition, the study discovered that there were numerous factors preventing the teachers from using the aforementioned teaching methods in their teaching process, such as overcrowded classrooms; lack of resources; learners' attitudes toward learning Physical Science; time allocated to Physical Science lessons; learners' poor backgrounds in Physical Science; and learners' poor English proficiency. Finally, the results from the interviews revealed the strategies that might be implemented to improve the teaching of the Grade 12 Physical Science. In the light of the above findings, the study recommends that the advisory teacher visit schools more often to ensure that all the Grade 12 Physical Science teachers in the region are using effective teaching methods in their teaching of the Grade 12 Physical Science Ordinary Level lessons. The study recommends that the teachers improvise for the unavailable laboratory materials by using alternative materials from the environment, as well as recyclable materials during practical work in their teaching.

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LIST OF ABBREVIATIONS AND ACRONYMS

DNEA	Directorate of National Examinations and Assessment
EMIS	Education Management Information System
MASTEP	Mathematics and Science Teachers Extension Programme
MBESC	Ministry of Basic Education, Sport and Culture
MoE	Ministry of Education
NPC	National Planning Commission
NSSC	Namibia Senior Secondary Certificate
OER	Oshana Educational Region
PSOL	Physical Science Ordinary Level
UNAM	University of Namibia
ZPD	Zone of Proximal Development

CHAPTER 1

INTRODUCTION

1.1 ORIENTATION OF THE STUDY

Namibia has developed a Vision 2030 document which aims to transform the country into a knowledge-based society and industrialised nation by the year 2030 (National Planning Commission [NPC], 2003). The document states that the development of science is crucial and needs to be strengthened in order to facilitate the realization of Vision 2030:

> The challenge in preparing learners for a knowledge-based society is in providing well-managed flexibility in the approach to teaching and learning, as well as in providing learning experiences which motivate learners to learn more" (Ministry of Education [MoE], 2010, p.26).

Kriek and Grayson (2009) argue that in order to produce a greater number and quality of scientists and technologists, the number and quality of passes of learners in Physical Science need to increase. There is thus a need to have professional holistic science teacher development to support the teachers along three dimensions simultaneously, namely, the subject content knowledge, teaching approaches and professional attitudes toward teaching in the classroom settings. The improvement of teachers' subject content knowledge would increase teachers' confidence, and so make them more prepared to use a variety of teaching methods, in particular, more learner-centred and activity-based approaches, for example, group work, problem-based learning, and practical work. Such innovative teaching approaches make science classes more interesting and lead to better understanding of concepts. The teachers' subject content knowledge is also likely to

increase their willingness to spend more time on tasks and make more use of innovative approaches in their teaching.

Before Namibia's independence in 1990, teachers were trained to teach for rote learning rather than knowledge with understanding (Amutenya, 2002). They taught mainly by means of transmission of knowledge in which they concentrated on teaching the subject content by placing more emphasis on how to organise, structure and present the subject content in a way that was easier for their learners to understand (Ylanne, Trigwell, Nevgi, & Ashwin, 2006). After Namibia's independence in 1990, the Ministry of Basic Education and Culture (MBEC) introduced a learner-centred teaching approach by which learners were expected to be at the centre of the teaching-learning process (Mathematics and Science Teachers Extension Programme [MASTEP], 2002). The teacher was expected to be a facilitator of teaching and learning in the classroom, in which learners were expected to construct their own knowledge and understanding. He or she was to focus on what learners do in relation to their efforts in order to activate their existing conceptions about the subject content (Ylanne et al., 2006).

Mji and Makgato (2006) reported that the use of outdated teaching practices and lack of a subject's basic content knowledge among teachers resulted in poor teaching standards in the classroom. They further claimed that a large number of under-qualified teachers in overcrowded and non-equipped classrooms made the teaching standard even worse. Acknowledging that the Namibian educational system needs continuous improvement in quality of teaching to bring about good examination results, the Ministry of Education is determined to "continue to strive for the provision of quality teaching and learning,

improved learning outcomes, and the production of an educated and skilled workforce needed for a productive and competitive nation through effective implementation of this strategic plan" (Ministry of Education, 2012a, p.5).

Aziz and Yasin (2013) state that quality teaching is the ability of teachers to achieve the subject's instructional objectives successfully. The effective teaching of Physical Science depends, to a large extent, on the amount and quality of planning that the teacher puts in before the class (Menjo, 2013). Similarly, Shadreck and Isaac (2012) believe that science teachers can promote and enhance teaching effectiveness by applying a positive learning approach, understanding their learners' learning difficulties, acknowledging the individual learner and being someone learners can trust. Teachers need to be able to organise and teach in interesting and flexible ways, by using good teaching methods, including experimentation. In addition, they should have an ability to plan and structure the science content and employ practical investigation in their classroom to bring about effective teaching. Shadreck and Isaac (2012) further state that learners are motivated not only by the teachers who know how to teach science but also in those who can help them to learn science and make learning more fun.

The teachers are expected to use hands-on and problem-solving activities, employ different teaching methods and plan lessons in a flexible way in order to promote high thinking skills as well as accommodate different learners' needs in their teaching. The Ministry of Education (2010) in Namibia expects teaching in all schools countrywide to be conducted using a learner-centred approach, however, teachers still prefer using their own teaching approaches, ignoring the Ministry's policy (Ministry of Basic Education, Sport and

Culture, 2004). The same document further states that the reluctance of teachers to use learner-centred approaches has affected teaching and learning performance. Despite the efforts to make learner-centred education a policy that should be applied in the teaching-learning process to improve learners' performance it is still not clear to what extent teachers adopt it (Ministry of Education, 2010).

Wolfaardt (2012) observes that teachers are not addressing thinking skills as they teach, hence they focus mostly on so-called 'facts', but not understanding. In most of the schools, teachers still have a tendency to use traditional teaching, placing more emphasis on teacher-centred approaches in their classrooms. In the same vein, Kapenda (2008) maintains that many teachers prefer other teaching methods in their teaching, because using the learner-centred approach is not easy and has many challenges, such as lack of discipline among learners, insufficient resources and overcrowded classrooms. Ylanne et al. (2006) believe that teachers who teach in the 'hard' disciplines, such as Physical Science, Engineering and Medicine, are likely to employ a teacher-centred approach to teaching, whereas learner-centred approaches are more commonly used in 'soft' disciplines such as Social Sciences and Humanities. Despite this, the contextual and dynamic nature of approaches to teaching need to be emphasised in the classroom, in which teachers may sometimes use the learner-centred and the teacher-centred teaching approaches, depending on the teaching context, in order to enhance learners' understanding.

According to Al Maghraby and Alshami (2013), teaching strategies must be examined to prepare learners more effectively to meet new and rapidly changing practices and professional demands. The Ministry of Education registered disappointment with the 2012

National Examinations results and called upon inspectors and principals to make sure their circuits and schools reached the pass rate of 80-100% as the target for the year 2014 (Ministry of Education, 2013a). The National Examiner's reports revealed that, in 2011, 2012 and 2013, learners' performance in Grade 12 Physical Science Namibia Senior Secondary Certificate [NSSC] Ordinary Level examination results in the Oshana Educational Region (OER) were very poor, with extremely higher numbers of learners obtaining E to U symbols (Directorate of National Examinations and Assessment [DNEA], 2011, 2012, 2013); as presented in Table 1 (below).

Table 1: Performance of learners in Physical Science [NSSC] Ordinary Level examinations of 8 schools in Oshana Region from 2011 to 2013

Schools	2011 (E-U symbol)	2012 (E-U symbol)	2013 (E-U symbol)
A	68.42%	76.74%	93.18%
B	69.23%	84.21%	56.25%
C	80.41%	63.08%	76.47%
D	64.29%	59.92%	70.39%
E	96.87%	80.0%	83.87%
F	78.57%	69.12%	77.27%
G	66.67%	64.20%	64.47%
H	62.79%	65.79%	58.33%

(Source: DNEA, 2011, 2012, 2013).

Since independence, the Ministry of Education has been trying to reform the education system in order to provide quality teaching and learning, and to improve learners' academic performance (Ministry of Education, 2012a). However, in 2013 the Minister of Education, David Namwandi, acknowledged that "Namibia is one of the countries with a high failure rate, with only 23 percent pass rate for the 2013 Namibia Senior Secondary

Certificate [NSSC] Ordinary Level for full-time and part-time candidates" (Tjimbundu, 2014, p.14).

It is against this background that the current study sought to investigate the factors affecting the effective teaching of Grade 12 Physical Science [NSSC] Ordinary Level in the Oshana Educational Region.

1.2 STATEMENT OF THE PROBLEM

In the annual reports of the Directorate of National Examinations and Assessment [DNEA] on the Grade 12 National Examinations results of 2011, 2012 and 2013, the Oshana Educational Region was ranked, respectively, in positions 11, 11 and 10 out of 13 education regions (Ministry of Education [MoE], 2011, 2012, 2013). Although the Education Management Information System (EMIS) of 2012 indicated that there were about 97.8% qualified teachers and only 2.2% unqualified teachers in the Oshana region, this does not reflect the Physical Science Ordinary Level national results. The results indicated no improvement in the learners' competence in their learning (Ministry of Education, 2012b). For instance, the DNEA report of 2011, 2012 and 2013 indicated that eight out of 14 secondary schools in the Oshana region had been performing poorly in Physical Science in the Namibia Senior Secondary Certificate [NSSC] Ordinary Level examinations. Learners who obtained E-U symbols in the National Examination in the three consecutive years numbered 73.41%, 70.38% and 72.53% respectively (MoE, 2011, 2012, 2013).

In order to improve, an investigation is required into the teaching of Physical Science and the use of teaching methods, such as group work, problem-solving, and practical work methods. Teaching methods accommodate different learning styles that promote a variety

of learners' subject understanding (Skinner, 2010). According to Lei (2002), science teaching requires the use of teaching methods that encourage learners to actively participate during instruction, rather than being passive and limited to taking notes quietly. Therefore, this study sought to investigate the factors affecting the effective teaching of Grade 12 Physical Science in selected secondary schools in the Oshana Educational Region of Namibia by addressing the following research objectives.

1.3 RESEARCH OBJECTIVES

This study intended to achieve the following objectives:

1. To determine the views of teachers, school principals and the advisory teacher on the factors affecting the effective teaching of Grade 12 Physical Science in the Oshana Educational Region.
2. To find out to what extent Grade 12 Physical Science teachers use effective teaching methods in teaching Physical Science.
3. To suggest strategies that can be implemented to improve the teaching of Grade 12 Physical Science in the Oshana Educational Region.

1.4 SIGNIFICANCE OF THE STUDY

In an effort to improve the teaching of Grade 12 Physical Science in the Oshana Educational Region secondary schools and make the learning of Physical Science more attractive to learners, this study could make the following important contributions to the literature on education in Namibia. The findings might help in improving the teaching of Grade 12 Physical Science and provide grounds for further research. It might also help Physical Science teachers to reconsider their teaching methods in order to improve learners' performance in the Physical Science [NSSC] Ordinary Level examinations. It

might provide Physical Science teachers, Physical Science curriculum planners and government officials with detailed information about the actual picture of Grade 12 Physical Science teaching and learning in the secondary schools in the Oshana Educational Region, and possible effective ways of improving the situation.

1.5 LIMITATIONS OF THE STUDY

The major limitation of the study was that not all the schools in the Oshana Educational Region were selected to participate due to lack of finances on the part of the researcher. As a result, generalising the findings to the entire educational region would not be possible and the views of the participants might not have been reliable because some could have provided biased information to create favourable impressions.

The presence of the researcher in the classroom during the lesson observations could have affected the teaching mode of the teacher as well as the learners' behaviour. For example, during teaching, they might have been uneasy with the presence of a stranger, especially during the first day, which could in turn have affected their classroom participation.

1.6 DELIMITATIONS OF THE STUDY

This study was limited to eight selected secondary schools that offered Grade 12 Physical Science Ordinary Level in the Oshana Educational Region only. The study was limited to school principals of the participating schools, Physical Science advisory teacher and Grade 12 Physical Science teachers.

1.7 DEFINITION OF TERMS

The following terms are defined as they were used and understood in the study:

Teaching method - a particular technique a teacher uses to help the learners gain the knowledge they need to achieve a desired lesson outcome (Jacobs, Vakalisa, & Gawe, 2004). In this study, teaching method was considered to be any approach the teacher decided was appropriate to deliver the subject content to learners in the classroom.

Effective teaching - has been defined as "teaching which successfully achieves the learning by pupils intended by the teacher" (Kyriacou, 2001, p.5). In this study, it implies that the teacher significantly tried to make learners understand certain knowledge and skills in the classroom settings by applying different teaching methods, such as group work, problem-based learning, and practical work, which seek to promote the development of learning and understanding among the learners in relation to the objectives to be taught (Shadreck, & Isaac, 2012).

Effectiveness - in teaching is measured by looking at the relationship between teacher behaviour, and learner learning (Richards, & Nunan, 2000). In other words, if one teaching method or technique makes the learners understand the subject knowledge being taught, it is regarded as effective. Conversely, if the learners does not understand what is taught by the teacher using a certain method or technique then that method is regarded as ineffective.

1.8 SUMMARY

In this chapter the researcher provided the orientation of the study on the factors affecting the effective teaching of Grade 12 Physical Science Ordinary Level in selected secondary schools. The researcher also outlined the nature of the problem being researched, the research objectives that helped answer the problem, and the significance of the study. The

study further outlined limitations and delimitations of the study, as well as definition of the key terms used. The next chapter presents the theoretical framework as well as a review of literature.

CHAPTER 2

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1 INTRODUCTION

The first section of this chapter discusses the theoretical framework on which this study was based, while the second section focuses on the review of literature to determine what has already been conducted locally, nationally and internationally on the factors affecting the effective teaching of Physical Science in schools. The latter also discusses the teaching methods that can promote effective teaching in Physical Science in a classroom setting, as well as possible strategies to improve its teaching in secondary schools in Namibia.

2.2 THEORETICAL FRAMEWORK

This study is informed by Vygotsky's theory of the Zone of Proximal Development (ZPD), defined as:

> ...the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers (Vygotsky, 1978, p.86).

Lui (2012) explains that teaching in the ZPD provides learners with challenging tasks that promote higher level thinking that motivates them to learn. It provides meaningful instruction and feedback that helps drive further development at an appropriate pace and creates a learning environment in which learners are valued as individuals, and work in collaborative groups in which their creativity and thought are acknowledged and accepted.

On the other hand, when using the theory of ZPD, teachers easily identify their learners' strengths and weaknesses which can enable them to modify learning experiences of individual learners and learners as a group. According to the ZPD theory, teachers are able to engage learners in social interactions for effective learning to take place (Lui, 2012).

This theory, therefore, fits the purpose of this study, in investigating the effective teaching of Physical Science with emphasis on what a teacher can do to help learners to work independently. The important issue then becomes which effective tools of teaching the teacher (expert) is using to improve the learners' (novice) understanding and performance in Physical Science. The use of teaching methods such as group work, problem-based learning, and practical work might allow learners to engage in social interactions which will promote thinking as well as creativity to bring about good understanding of Physical Science content and to enhance performance.

According to Killen (2013), from a constructivist perspective it is important for teachers to place learners at the centre of teaching endeavours, and to create a good learning environment to help them construct their knowledge rather than just absorb it. Killen further refers to the term 'scaffolding', used by Vygotsky to describe the teaching and learning process. During it the teacher is expected to provide sufficient assistance and as their learners begin to understand new skills and work independently the teacher will gradually decrease the assistance (Killen, 2013). Teachers are expected to employ teacher-direct approaches at the beginning of teaching a new skill or topic to their learners (Jacobs, Vakalisa, & Gawe, 2011), whilst for Vaughn and Bos (2012) an essential element of

effective instruction a teacher can use in the teaching and learning process for learners to achieve the lesson learning objectives for any subject is scaffolding.

Parsons, Hinson and Brown (2001, p.56) define scaffolding as "support for learning and problem solving; the support could be clues, questions, prompts, breaking a problem down into steps, and anything else that helps a learner become more successful" in the subjects they are learning. Vaughn and Bos (2012) state that, through scaffolding, the teacher is expected to make proper adjustment and extension to their instructions so that learners can be challenged and enabled to develop new skills. Through scaffolding during instruction, teachers are able to meet learners' needs by manipulating their tasks, materials, group size, pace and presentations. One way for a teacher to scaffold lesson instruction effectively is to teach new subject content in manageable steps, breaking complex activities into smaller steps to allow learners to master each step; using explicit, systematic instruction for each step; and providing sufficient practice and review until learners are independent and confident with what they are learning.

Vaughn and Bos (2012) further state that every step that learners are performing should be slightly more difficult than the previous one, and should lead to the full, complex skill they are learning. In the scaffolding process, teachers need to provide specific and sufficient instructions for each step of a complex task and they should also create a clear picture of what sub-skills learners have mastered and what still requires further exercises. Vaughn and Bos (2012) argue that when teachers intend to teach through small segments, each step should be taught by using explicit and systematic instruction. In particular, the instruction must include modelling, guiding and independent practice as well as using consistent

instructional procedures. In systematic instruction, the teachers must place the instructions in sequence, from easier skills to more complex ones, and teach the easier skills before introducing more complex ones (Vaugh, & Bos, 2012).

According to Muijs and Reynolds (2011), learners learn from their peers, both of the same age and of a higher age and developmental level. They can only achieve this through scaffolding in the ZPD, in which the role of the teacher in the classroom comes to the fore in learning, in that teachers can help bring the learners' knowledge to the desired level by intervening in the ZPD. Teachers could achieve the desired level by providing learners' thoughts through scaffolding, in which once the learning process is complete their assistance is no longer needed by their learners. Santrock (2009, p.51) defines ZPD as "the range of tasks that are too difficult for the child to master alone but that can be learnt with guidance and assistance of adults or more skilled children". Teachers need to understand the concept of scaffolding which is an extension of Vygotsky's theory of ZPD in which teachers would change their levels of support in accordance with the needs of the learner at a given time. For example, if a learner understands in part the kinetic particle theory, the teacher would then help him or her understand this theory in full by offering scaffolding.

2.3 LITERATURE REVIEW

This section provides a review of literature on the factors affecting the effective teaching of Grade 12 Physical Science in schools. It also examines the evolution and meaning of effective teaching from the existing literature, bringing out some issues on factors affecting the effective teaching of Physical Science in secondary schools, the teaching methods that promote effective teaching of in in classroom settings and the strategies that could be implemented to improve the teaching of it in schools.

2.3.1 The concept of effective teaching

The evolution of the concept 'effective teaching' is well-established, having in the 1960s focussed on what teachers did in the classroom (Killen, 2013), after which "research on effective teaching focused fairly and squarely on activities in the classroom, and in particular, the interaction between the teacher and pupils" (Kyriacou, 2001, p.5). In the 1980s, it was realised that the teaching of the subject content had a significant influence on learners' learning and when teachers reflected on what they taught the previous day in their classroom it helped them to modify their teaching methods to become more effective. In the past 30 years, the understanding of how learners learn has evolved, leading to a redefinition of effective teaching. Currently, the theories are connected to understanding how learners learn and effective teaching has now been accepted as teachers facilitating learning rather than to be a source of all knowledge in the classroom (Killen, 2013). This means that teachers now should help learners to construct their own understanding, rather than giving them what they expect learners to memorise. According to Hill (2014), teachers who have had the opportunity to explore what effective teaching consists of and to develop their capabilities to accomplish it will be better equipped to form a constructive platform with relevant teaching methods for learners and to meet the challenges inherent in teaching to make their learners better understand the subject content.

Effective teaching has been defined in many different ways, for example by Shadreck and Isaac (2012) as the ability to be useful, supportive, and valuable in assisting learning. Skinner (2010), on the other hand, defines teaching as being effective when the teaching and learning expectations are achieved successfully in the classroom in which learners are taking full responsibility for their learning. Thus, an effective teacher is regarded as someone who promotes the learners' attainment of knowledge and skills by applying

different teaching methods, such as group work, problem-based learning and practical work that accommodate different learning styles, as well as allows learners to work more in the teaching and learning process.

According to Kyriacou (2001), there are two simple elements involved in achieving effective teaching. Firstly, the teacher is expected to have a clear idea, through planning, of what learning is to be fostered, which includes the types of teaching methods to be used, secondly the set-up, which provides a learning experience that can make learners understand what is going to be taught. Dhurumraj (2013) noteds that teaching is a profession in which teachers are expected to have high confidence in everything they do with their learners. The teacher is required to have an interest in the subject, be committed and dedicated to the teaching and learning process, as well as able to eradicate any fear learners may have towards learning the subject, and encourage them to study with confidence in order for them to excel in their examinations.

Parker (2004) states that teacher training institutions need to know how best they can train teachers in the development of subject knowledge and imparting knowledge and understanding in the teaching and learning of science. For example, effective teaching can occur in the science classroom if a teacher is able to make the learners understand the difference between a stationary object and an object moving with constant speed, by engaging learners to experience through demonstrations or observations. Learners can only understand, in this scenario, if the teacher lets the learners experience both objects of balanced forces and without balanced forces through practical work. According to Killen (2013), effective teaching methods are much more learner-centred. In other words, for

effective teaching to take place in the classroom the teacher is expected to do less and act as a facilitator in the teaching and learning process, while learners take responsibility for their learning through interactions in small groups, solving subject problems by exploring through different subject materials and undertaking practical work in order to consolidate what they have learned in real-life situations to enhance their understanding.

Petty (2009) states that the most effective teaching methods allow teachers to do less, and the learners to do more by actively participating in their learning activities. These methods, such as group work, problem-based learning, as well as practical work make the teaching process less tiring and more enjoyable to both the teacher and the learner. Killen (2013) suggests that good teaching is not about helping learners to collect knowledge passed on to them by the teacher, but it helps them to make sense of new knowledge, incorporate it with the existing ideas and apply the new understandings in meaningful and relevant ways.

The good teaching approaches could be achieved in classroom settings when teachers start employing the teaching methods which are more learner-centred in their exercises. The learner-centred instructional approaches that dynamically involve learners in the learning process are known as 'active learning', and promote participation in the classroom (Menekse, Stump, Krause, & Chi, 2013). It "involves students and teachers; education becomes a two-way process with both the teacher and the child learning from each other" (Dhurumraj, 2013, p.16).

Menekse et al. (2013) maintain 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. All these qualities promote effective teaching in the classroom, however, active learning is suitable if implemented in the context of problem-based, inquiry-based, discovery, collaborative, cooperative, team-based, and inductive learning methods. In addition, teaching methods such as these are regarded as good in terms of making learners use their thinking capabilities to understand the subject content, because they are expected to be actively involved in the teaching and learning process.

Kyriacou (2001) states that the basic task of the teacher to create effective teaching is to set up a learning experience in which learners are effectively engaged in the mental activity which brings changes in the learners' cognitive structure, as well as to establish the desired learning outcomes among the learners. Teachers, therefore, need to be sensitive to the ways in which different teaching methods encourage different learning styles, and the degree to which a particular mental activity brings understanding in the classroom. According to Dogan, Cakiroglu, Bilican, and Cavus (2013), the understanding of science in schools among learners involves three stages. Firstly, an understanding of some concepts of science content, including understanding of evidence, laws and theories which consist of scientific knowledge; Secondly, an understanding of the scientific approach to inquiry involves the ability of learners to define scientific study and distinguishing science from non-science; and thirdly, an understanding of science as a social enterprise, which refers to the understanding of science in society and society in science, related with knowledge about science rather than the natural world. In other words, one way the science teachers could make their learners understand the science content is when they are aware of these three stages which involve a broad understanding of science.

2.3.2 Teaching methods that promote effective teaching of Science

Al Maghraby and Alshami (2013) state 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. They should employ teaching methods which provide opportunities to learners to learn from each other through sharing knowledge and providing sufficient exposure of what they expect in the examinations, by giving them more problems to work on and chances to learn the subject content in real-life situations through undertaking practical work in the laboratory.

Khoboli and O'Toole (2011), however, propose that appropriate teaching and learning methods in teaching science, such as problem-based learning, practical work and group work, allow learners to interact and help each other to attain better subject understandings. The use of different teaching methods is likely to accommodate different individual learning styles among the learners. Khoboli and O'Toole (2011) argue that the teachers' commitment to learner-centred methods does not mean that all the designed activities are suitably covered with such methods, but that the choice of teaching methods should depend on the content of the lesson to be covered, the resources and time available.

The effective use of social learning techniques in the classroom can improve learners' performance by at least a grade and improve learners' behaviour, self-esteem and their attitudes to each other in the classroom setting (Petty, 2006, p.142). According to Shadrack and Isaac (2012), one way teachers can promote effective teaching in their classroom is by using the constructive learner method, comprehending learners' learning difficulties, accepting the individual learner, being someone learners can have faith in, teaching using different methods in interesting ways and applying practical activities in their lessons. However, Aziz and Yasin (2013) state that learners in secondary schools with effective

school management, teachers with high knowledge in the subjects they teach, enough learning facilities and relevant curriculum, tend to perform well.

According to a study conducted by Taraban, Box, Myers, Pollard and Brown (2007), there are two main teaching approaches that are commonly identified by learners. The first is the teacher-centred approach, which gives prominence to the teacher during the teaching-learning process. In this teaching approach the teacher does the major part of the work and the learner is left with limited work to do. The second one is the learner-centred approach, which promotes the learner's participation during the learning process and the role of the teacher is to facilitate. This approach would make learners better understand science content, because they are involved in learning activities. Petty (2009) states that, in general, the majority of teachers in secondary schools around the world tend to develop one or two teaching methods and stick to them, but this is believed to be wrong. It is thus assumed that use of a variety of teaching methods in a subject has more advantages, such as enhancing learners' attention and interest, as well as giving teachers the flexibility to be able to work with a wide range of challenges encountered in the teaching and learning process, rather than using one type of teaching method.

Edomwonyi-Otu and Abraham (2011) contend that the teaching of science is supposed to be result oriented and learner-centred, which can be only be achieved when learners are willing and when the teachers are using the appropriate methods and resources in teaching the learners. Since learners are curious by nature, they only need to be actively involved in the learning process in which they are continuously testing, speculating as well as building

their own personal knowledge. When learners personalise the knowledge, it will become valid, meaningful and useful to them to apply in different contexts.

Garcia (2003) noted that science in many schools is still being taught primarily through the lecture method and textbooks, rather than through exploration and experimentation which will allow learners to construct their own knowledge. In other words, some teachers in secondary schools are still not aware of what impact some teaching methods have on the teaching and learning of science. The following teaching methods, discussed below, are considered by teachers to be effective in teaching Physical Science.

2.3.2.1 Practical work

Dunne and Wragg (1997) found that practical work is a crucial component of coursework in the teaching and learning of Physical Science. Teachers use it to allow the learners to find out the reality by means of studying relevant examples and generalised statements. These types of teaching methods allow Physical Science learners to experience authenticity and to discover things on their own (Jacobs, Vakalisa, & Gawe, 2004). For example, in Experimental Techniques in the Physical Science [NSSC] Ordinary Level syllabus, learners are expected to use the appropriate apparatus for the measurement of temperature, mass, volume and time under the supervision of their teacher to understand how these work in real-life (Ministry of Education, 2009).

The coursework allows learners to obtain genuine understanding of Physical Science, by relating what they have learned with what they have observed (Dunne, & Wragg, 1997). The practical work which is the part of coursework encourages learners to learn through self-discovery and through exploration and observation (Ministry of Education, 2009). Rob (2012) argues that learners have three main reasons they regard science lessons as

important: for interest and activities, which include social and personal character development, participation through interactions and freedom to act independently, as well as a way of learning, including memorizing and recall of what they have learned. Most learners, therefore, found Physical Science lessons interesting, because they could explore and observe what they were learning during practical work in the laboratory:

> Attending laboratory sessions is important in learning Physical Science, because practical work in a way brings to life what is explained in textbooks. By seeing educators demonstrating or conducting experiments themselves, learners supplement what is in textbooks and, as a result, learning is enhanced. An advantage of laboratory usage is that it helps to improve learners' higher order learning skills, such as, analysis, problem solving, and evaluating (Mji, & Makgato, 2006, p.260).

The above quote illustrates that teaching learners through practical work in the laboratory allows them to interact with their peers and the teacher, by asking questions based on what learners are seeing, smelling, feeling, touching and hearing. These allow learners to make their own conclusions based on what they have observed in the laboratory, as well as to acquire good Physical Science understanding. However, practical work is essential to expose learners to the Physical Science content practically, to enable them to weigh up what they have read in their textbooks with what they have observed, to enhance their understanding.

Mhlongo, Kriek and Basson (2011) claim that the best classroom for teaching and learning for understanding of Physical Science is a laboratory. The teaching of Physical Science cannot be significant to learners in the absence of worthwhile practical experiences in the laboratory. In other words, the Physical Science content will not be significant to learners if teachers chose to use theory in teaching and learning: "Students are better able to understand the natural world when they work directly with natural phenomena, constructing their knowledge as they go along as opposed to experiencing it only through print materials" (Garcia, 2003, p.9). Similarly, Awe (2007) states that Physical Science is a practical subject that is open to the use of learner-centred approaches with which learners can take active roles in the teaching and learning process to promote their understanding and enhance their performance. Abrahams and Miller (2008) note that practical work is more useful and enjoyable to learners in the teaching and learning process than other forms of teaching methods of science. is and Abraham (2011), on the other hand, argue that science practical work in schools aimed at providing learners with the opportunity to be able to obtain meaningful learning, acquire appropriate skills and attitudes that enable them to cope with the changing world; enabling them to contribute to the development of their societies.

2.3.2.2 Group work

According to Petty (2009), 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 to the full class a platform on which to make contributions to a group. He further states that group work allows learners to become involved in task-centred talking and makes class activities more enjoyable, thus creating opportunities for learning to take place:

> It can give the teachers an opportunity to make use of their learners' views and experiences. What is more, there's a built-in self-checking and peer-tutoring aspect to most group work, where errors in understanding are ironed out, usually in a very supportive atmosphere (Petty, 2009, p.232).

Muijs and Reynolds (2011) state that when learners work in groups they help each other to develop understanding of the subject content, exchanging viewpoints as they try to solve problems. Group work also allows learners to give each other scaffolding, in the same manner the teacher can during questioning. Group work can also provide an opportunity to learners to restructure their own thinking skills, through interaction with peers, and help them better understand their own strengths and weaknesses (Muijs, & Reynolds, 2011). The use of group work by Physical Science teachers can help in promoting interactions among learners and boost the morale of learners to express what they know about the subject.

2.3.2.3 Problem-based learning

Folashade and Akinbobola (2009, p.46) define problem-based learning as "a strategy that consists of carefully selected and designed problems that demand, from the learner, acquisition of critical knowledge, problem solving proficiency, self-directed learning strategies, and team participation skills". In addition, Folashade and Akinbobola (2009) state that problem-based learning technique is more effective in the teaching and learning of Physics and other science subjects. They add that this method exposes learners more to the realities of life and makes them work as scientists, enabling them to acquire knowledge

on their own. The teacher's work is to correct any misconceptions and facilitate the practical work.

Furthermore, problem-based learning methods do not permit a teacher to work as a dictator or sole owner of the subject knowledge, but they do permits learnes to be actively involved in the teaching and learning process in order to enhance their understanding (Folashade, & Akinbobola, 2009). Science teachers can thus use problem-based learning because they want their learners to explore different problems on their own. This is a way of training learners to exercise their mental capabilities as most of the examination questions require them to apply higher level thinking.

Smith (2012) writes that learners find the problem-based learning activities more interesting and better in terms of making them think toward the solutions. They prefer problem-based activities compared to a typical laboratory activity for developing their skills of studying independently, to enhance team work and communication skills and to explore scientific ways of writing and researching. This technique is believed to bring improvement in the academic achievement in the teaching and learning of sciences, particularly among the low ability learners, as well as to improve the performance of learners in the national examination results (Folashade, & Akinbobola, 2009). Similarly, Jacobs, Vakalisa and Gawe (2004) note that problem-solving is a form of inquiry learning that engages learners in seeking knowledge, processing information and applying ideas to real-life situations. They argue that teachers must present challenging problems to their learners, encouraging them to take greater responsibility for their own learning. Jacobs et

al. (2004) also state that this method helps learners develop thinking and reasoning skills, as well as making them want to learn more about what they are being taught.

2. 3 FACTORS AFFECTING THE EFFECTIVE TEACHING OF PHYSICAL SCIENCE

Kapenda (2008) states that in some Namibian senior secondary schools, teachers mostly use the traditional method in their teaching, but this does not give learners interactive opportunities to enhance their understanding. In some schools, teachers are not able to employ different teaching methods, due to several factors, such as the unavailability of equipment or facilities. However, Kandjeo-Marenga (2011) points out that most Namibian secondary school teachers find it difficult to teach science practical work due to lack of zlaboratories and others have inadequate learners' workstations, thus forcing teachers to use teacher demonstration methods rather than group experiments in teaching science.

According to Muijs and Reynolds (2011), there are general teaching factors that appear to be associated with learners' positive learning outcomes, for example, teacher's good subject knowledge; good questioning skills; an emphasis upon the lesson introduction; stating learning objectives clearly; good time management; effective planning of lessons and good classroom management. Teachers who have many of the aforementioned qualities may lead their learners to achieve high performance in their subject. Muijs and Reynolds (2011) further state that if teachers have good management of learners' behaviour, allow interactions in teaching, provide attention to individual learners and employ different teaching methods as well as create a conducive teaching-learning climate in their classroom there is improvement in the understanding of content by learners.

Jacobs, Vakalisa and Gawe (2004) argue that effective teaching and learning depends on how teachers create and maintain a good teaching and learning environment in their

classrooms. This could be achieved if the teacher knows how to prepare the subject content to be taught, organise the classroom setting as well as maintain a good level of discipline among learners during the teaching and learning process. However, the teaching and learning environment, teacher's preparedness as well as learners' discipline are among the commonly perceived factors in effective teaching (Jacobs,Vakalisa, & Gawe, 2004).

Jacobs, Vakalisa and Gawe (2011) state that it is important for the teacher to have comprehensive knowledge on their subject content they are teaching, primarily because it is not enough for a teacher to know what is required in the subject's syllabus for the given grade without a clear vision of where and when the subject content can be applied. This type of knowledge helps the teacher to design meaningful learning activities for both fast and slow learners as well as to set appropriate remedial materials for learners who might experience difficulties with the subject content. According to Hill (2014), schools need teachers with subject knowledge and teaching experience as well as courage and compassion. In addition, Hill (2014) states that learning should not only be a matter of measurable experience in which learners are expected to acquire new knowledge, but should also be a transformative experience that can change learners, enrich their knowledge, and enlarge their perspectives.

According to Synder and Viogts (1998), the unavailability of teaching and learning materials in schools, such as textbooks, syllabus, computers and equipment, has a negative influence on teaching which could cause ineffective teaching. They further state that, in general, for some schools resources might be sufficient, but teachers are not effectively using them. Some teachers in lack the necessary experience in how to employ certain

resources in teaching and learning to enhance the learners' understanding, however, the available resources at schools in some cases are inappropriate for learning objectives (Synder, & Viogts, 1998). Accoding to Likoko, Mutsotso and Nasongo (2013), effective teaching cannot take place in the classroom if basic instructional resources are not available. The availability of relevant teaching-learning materials and facilities in the classroom setting are important for effective teaching to take place. They further argue that learners' performance in a subject is affected by the quality and quantity of teaching and learning resources. However, in schools with adequate facilities the learners tend to perform well in examinations compared to the poorly equipped schools (Likoko et al., 2013).

On the other hand, Folashade and Akinbobola (2009) are convinced that the inappropriate use of teaching method in science classrooms, large class size, lack of sufficient funds, improper monitoring, and lack of standard laboratory equipment are among the main factors considered to be affecting the performance of learners in sciences. They further state that learners' intellectual ability responds differently depending on the teaching methods the teacher uses, and this can also be a possible factor. Therefore, it is assumed by Folashade and Akinbobola that when the teachers correctly use the teaching methods this could influence the learners' understanding and might enhance the performance of the low achieving learners.

According to Bannett (2003), the teaching of science requires effective communication, especially the terminologies in its content, which need to be taught with caution. He noted that science teachers use unfamiliar terminology in their teaching without explaining such

concepts and so cause many learners to misunderstand the content of the subject. Bannett believed that one way to deliver the science content successfully is for teachers to present the scientific ideas in such a way that they avoid using complex terminologies in their teaching. Ouma (2012) observes that the use of language in science contexts and classrooms by the teacher has a major influence on the level of learners' understanding of the lesson objectives and their retention of science concepts. As a consequence, Physical Science teachers who do not have good English proficiency would be constrained in explaining some science concepts in the classrooms, and so reduce learners' understanding of lesson objectives.

Simonds and Cooper (2011) emphasize that instructional communication is another factor for teachers to teach their lessons successfully. The communication skill is what the teachers need, regardless of the subjects they teach, and to teach competently in their classroom for effective teaching to take place. Teachers need to have a certain level of communication competence in order to be effective in their classroom and in some occasions a teacher might be an expert in the subject but if he or she cannot communicate what is to be learned in a way that learners understand, learning cannot be achieved. In addition, Mji and Makgato (2006) note that other factors associated with poor performance of learners in schools are categorised into direct and indirect influences. The factors with a direct influence that relate to teaching methods teachers use in the classrooms are content knowledge, motivation, laboratory use, and non-completion of the content syllabus over a year. The indirect influence was attributed to the role of the general language usage in the subject content.

It appears that for the quality of science teaching in schools to improve, there are a number of 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. The poor background of science knowledge in teachers 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 STRATEGIES NEEDED TO IMPROVE THE TEACHING OF PHYSICAL SCIENCE IN SCHOOLS

The use of exploration-explanations sequence of instruction to teach Physical Science, in which the teachers may allow learners to predict, share, observe, and explain (PSOE), helps learners to understand what they are learning (Brown, & Friedrichsen, 2011). For example, in the straw and paper-tent demonstration, learners first need to predict what will happen when the teacher uses a straw to blow into a paper tent. 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 sheet of paper then share their predictions in order to provide an explanation to their peers. During the demonstration lessons, they will observe what will happen when the straw is blown under the paper. 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 that this method (PSOE) allows every learner to engage in the teaching and learning activities.

Another possible strategy the science teacher may employ in the teaching and learning of Physical Science is cooperative learning, which Kilic (2013, p.144) define 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 teachers 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 bejng learned. Garcia (2003) regards one possible way to improve the teaching of science in schools as being when the teachers realise that science subjects are more than just a set of activities, but there are a number of aspects science teachers need to consider in order to teach science effectively, notably the science content, the processes used by scientists 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.

2.5 SUMMARY

This chapter has presented and discussed the theoretical framework that informed the study, namely the theory of Vygotsky's Zone of Proximal Development (ZPD) (Vygotsky, 1978), that focuses on the difference between what learners can do independently and what they are able to do with the assistance of the teachers and peers. The chapter also provided a review of relevant literature on the factors affecting the effective teaching of Physical Science in the secondary schools and the teaching methods considered promoting the effective teaching of Science, such as group work, problem-based learning, and practical work methods. In addition, the strategies to improve the teaching of Physical Science were reviewed. The next chapter presents the research methodology used in this study.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

The main focus of this chapter is the methodology used in the study, including the research design, population, sample and sampling procedures, research instruments, pilot study, data collection procedures, data analysis and ethical considerations.

3.2 RESEARCH DESIGN

This study used a mixed method research approach that was both quantitative and qualitative in nature: "The mixed method procedures are those in which the researcher converges or merges quantitative and qualitative data, in order to provide a comprehensive analysis of the research problem" (Creswell, 2009, p.14). An explanatory sequential mixed method design was used in which the researcher first collected quantitative data, analysed the results then used them to collect the qualitative data. This was followed by an analysis and interpretation of the overall results (Creswell, 2014).

The quantitative approach was used to collect numerical data from the questionnaires on the views of the participants on the factors affecting the effective teaching of Grade 12 Physical Science Ordinary Level in the Oshana Educational Region. The qualitative approach, on the other hand, was used to gain an in-depth understanding of the data collected on the factors affecting the effective teaching of Grade 12 Physical Science Ordinary Level in the region through semi-structured interviews. Lesson observations were made to complement findings from the questionnaire and interview phases. The lesson observations also provided a means of triangulating the data.

3.3 POPULATION

Henning, Van Rensburg and Smit (2004) defined a population as a group of individuals or objects with one or more features in common that are of interest to the study. The population of this study comprised all the 14 secondary schools in the Oshana Educational Region, 28 Grade 12 Physical Science Ordinary level teachers, 14 school principals and one advisory teacher for Physical Science Ordinary Level in the Oshana Educational Region. The region was selected purposively because of the consistently poor performances recorded in Physical Science [NSSC] Ordinary Level examinations in 2011, 2012 and 2013 (MoE, 2011, 2012, 2013).

3.4 SAMPLE AND SAMPLING PROCEDURES

Johnson and Christensen (2012) define sampling as the process in which researchers draw a sample from a targeted population of the study. Therefore, in order to understand the characteristics of the population (large group) the researcher studied the characteristics of a sample which was selected from a larger group so that a generalisation could be made to the population. This study employed purposive sampling to select eight out of 14 secondary schools in the Oshana Educational Region, using the following criteria: 1) Secondary schools that performed poorly in the Physical Science Ordinary Level in the National Examinations of 2011, 2012 and 2013 so as to determine what might be hindering effective teaching in the affected schools; 2) Secondary schools that were in close proximity to each other so that movement between the schools during the study would be minimized for the researcher.

According to Gall, Gall and Borg (2007), purposive sampling is a technique which is aimed at selecting a sample that is considered to be information-rich with respect to the purpose of the study. The sample of this study consisted of a total of 25 participants obtained as eight school principals from the eight selected secondary schools and one advisory teacher. Two Grade 12 Physical Science teachers with more than four years teaching experience from each selected secondary school were included in the sample, giving a total of 16 teachers. Teachers with four years' teaching experience were selected because they were thought to have had enough experience of hands-on teaching and were considered to be information-rich in the teaching of Grade 12 Physical Science [NSSC] Ordinary Level.

All the eight school principals and 14 Grade 12 Physical Science teachers and one advisory teacher completed the questionnaire. The sample of Grade 12 teachers was decreased by two, because at school A there was only one Grade 12 Physical Science teacher, while at school E one teacher was on maternity leave. After preliminary data analysis of the questionnaires, the researcher purposively selected five teachers from among the 14 Grade 12 Physical Science teachers to participate in the next phase of the study (interview and lesson observation). The criteria used in the selection of the five teachers to participate in the interview and lesson observation were that they had to have participated in the first phase of the study (questionnaire), be available and willing to be observed and interviewed. The advisory teacher was also interviewed and the researcher used an audio-recorder during the interview for all the participants after seeking consent from them. The data obtained from the questionnaires, interviews and observation schedules were triangulated.

3.5 RESEARCH INSTRUMENTS

Three types of research instruments were used for collecting data in this study, namely, questionnaires, interviews and observation schedules.

3.5.1 Questionnaires

Johnson and Christensen (2012) define a questionnaire as "a self-report data collection instrument that each research participant fills out as part of a research study" (p.162). They further state that researchers make use of them in order to obtain information about the thoughts, feelings, attitudes, beliefs, values, perceptions, personality, and behavioural intentions of research participants. Hence, researchers are able to measure a variety of characteristics of different phenomena. In this study, the researcher set up a closed-ended items questionnaire with a three points Likert Scale (*Agree*, *Not sure* and *Disagree*), in order to determine the views of teachers, principals and the advisory teacher on the factors affecting the effective teaching of Grade 12 Physical Science [NSSC] Ordinary Level in the Oshana Educational Region. The participants were requested to indicate either *agree*, *not sure* or *disagree* with the given statement in the questionnaire.

3.5.2 Interviews

Cohen, Manion and Morrison (2011) define an interview as a flexible tool for data collection which enables multi-sensory channels to be employed in the process, such as verbal, non-verbal, spoken and heard. In this study, a standardised semi-structured interview schedule was used to obtain in-depth information by probing and exploring participants' views (De Vos, Strydom, Fouche, & Delport, 2005) on the factors affecting the effective teaching of Grade 12 Physical Science Ordinary Level in the Oshana

Educational Region. The researcher also attempted to find out the extent to which the teachers used the perceived effective teaching methods, for example, group work, problem-based learning and practical work in their teaching. The responses helped to provide suggestions of strategies that could be used to improve the teaching of Grade 12 Physical Science Ordinary Level in the Oshana Educational Region. The researcher used an audio recorder during the interview sessions, with the consent of the participants.

3.5.3 Lesson Observation Schedule

Johnson and Christensen (2012, p.206) define observation as "the watching of behavioural patterns of people in certain situations to obtain information about the phenomena of interest". They further indicate that it is an important way of collecting information about people, because people do not always do what they say they do. In this study, a lesson observation schedule was used in an attempt to understand the world of the participants (Patton, 1990) and to provide more information on the extent to which the Grade 12 Physical Science Ordinary Level teachers used effective teaching methods in their teaching, for example, group-work, problem-based learning, and practical work methods. Five selected Grade 12 Physical Science teachers were observed for a minimum of five lessons each, to give a total of 25 lessons. The researcher also tried to observe teachers teaching similar topics in the syllabus according to a designed matrix, so that the interpretation of the data would be more meaningful.

Arrangements were made with the selected teachers so that similar topics were covered during the lesson observation period. The advantage here was that the researcher was able to be an observer and had the opportunity to work with the participants (teachers) in the

study and shared common experiences. The researcher did not take part in the proceedings of the lesson presentations to avoid influencing the outcome of the observation intentions.

3.6 DATA COLLECTION PROCEDURES

Permission to carry out the study was granted by the Permanent Secretary of the Ministry of Education and also by the Director of the Oshana Educational Region (sees Appendices 1 to 5). After being granted permission, the researcher wrote letters to the school principals, through the office of the inspector of the Oshana Educational Region to request school permission. The researcher then made appointments with the schools to brief the participants about the aims of the study. During the briefing sessions with the participants, the researcher requested every participant to feel free in the participation of the study. They were also assured that the information gathered would be kept confidential and would be used for research objectives only.

Upon arrival at each school, the researcher made arrangements with the principals and the Grade 12 Physical Science teachers to complete the questionnaires during their free time, in order to avoid disruptions of the school daily activities. The researcher also made arrangements with the advisory teacher to complete the questionnaire and he was interviewed in his office at a time convenient with his work schedule. After preliminary data analysis, the five selected teachers, based on the aforementioned criteria in the sample and sampling procedures, were first interviewed then observed teaching, immediately after the interview. The teachers' interviews were conducted individually in a separate room to promote trust among the participants and ensure data confidentiality. The lesson observations were conducted during school hours.

3.7 PILOT STUDY

The research instruments were piloted in one of the secondary schools in the Oshikoto Educational Region that had similar performances in Grade 12 Physical Science [NSSC] Ordinary Level examination as the secondary schools targeted for the main study in the Oshana Educational Region. However, this school was not part of the actual sample in the main study. This was in order to ensure that the research instruments (questionnaires, interviews and observation) were understood by the participants, which helped the researcher to refine the questions in the instruments ensuring they were appropriate and relevant to the study's objectives.

In addition, it was valuable to find out whether the type of data obtained could be analysed in line with the research objectives. To ensure the reliability and validity of the research instruments, the questionnaire, interview questions and observation schedule were given to the researcher's supervisors who made changes and corrections which were included in the final instruments. In addition, the instruments were given to the pilot study participants by the researcher to comment on the instruments and their comments were taken into consideration in the final instruments.

During the pilot study, arrangements were made by the researcher with the principal and four Grade 12 Physical Science teachers during their free periods to complete the questionnaires in order to avoid any inconvenience to the school daily activities. The advisory teacher also completed the questionnaire and was interviewed the same day in his office at a time that was convenient to his work schedule. After the preliminary data analysis of the questionnaires, the researcher purposively selected two teachers from the four Grade 12 Physical Science teachers who had taught Grade 12 Physical Science

Ordinary Level for more than four years and were available and willing to be observed while teaching.

3.7.1 Results of the pilot study

The results of the pilot study indicated that the research instruments (questionnaires, interviews, and the observation schedules) were valid and reliable for the study and that the majority of the items were understood by the participants. As Cohen et al. (2011) indicated, there is a possibility of errors in the designing of a research instrument. The pilot study revealed that there was a need to revise the research instruments, such as the questionnaire and the observation schedule. Some questions in the questionnaire were removed while some observation schedule items were also removed in order to improve the quality of the instruments. The following paragraphs indicate how the research instruments were changed and revised after the pilot study.

- *Instrument 1. Questionnaire for teachers:* The pilot study revealed that *Question 5* should be made *Question 1,* in order for the questionnaire to have an appropriate introduction for the participants. In *Question 2,* one statement was removed completely because it was found irrelevant to the question, and in *Question 3* one statement was shifted to *Question 4* for relevance purposes. In *Question 4*, three statements were completely removed from the question to avoid unnecessary repetition, since the required responses were similar. *Questions 6* and *7* were separated to form four independent questions. Thus, the number of questions in the revised teachers' questionnaire increased by two questions to make ten in total.

Questionnaire for advisory teacher: Questions 1, 2 and *3* were added to the revised advisory teacher's questionnaire in order to probe more information on the teaching strategies used in teaching Physical Science [NSSC] Ordinary Level by the teachers.

Questionnaire for the principal: Questions 2 and *3* were added in the revised questionnaire from the teachers' questionnaire in order to probe more information on teaching strategies used by Physical Science teachers in their teaching. *Questions 4* and *5* were separated into two different questions in the revised questionnaire for the principal. Thus, the number of questions in the revised questionnaire increased by four questions to make nine in total.

Instrument 2. Observation Schedule: The information in *item 1* was revised since it was found inappropriate for the study, while the information in *item 4* was revised by adding the necessary items and removing the unnecessary ones (see Appendix 11).

In addition, in administering the research instruments to the participants during the pilot study, the researcher experienced some challenges. For instance, securing appointments with teachers and the advisory teacher in the region at the same time as conducting interviews was a challenge, because participants were busy fulfilling their administrative duties. Nevertheless, the researcher tried several times to make other appointments which best suited the participants' work schedules. It was also observed from the pilot study that some of the information provided by the teachers in the questionnaires was not the same as the researcher had observed in their lessons.

3.8 DATA ANALYSIS

Analysis of data begins from the specific and builds 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 the closed-ended questions in the questionnaires was analysed using descriptive statistics (frequency tables) to identify general characteristics among the participants' views on factors affecting the effective teaching of Physical Science Ordinary Level in the Oshana Educational Region of Namibia. The responses of the teachers were scored and frequency tables created. The responses that had a higher score were then followed up in the interviews. The analysed results of the questionnaires were then used to formulate interview questions that could help give more data.

Descriptive statistics were also used to analyse the quantitative data from the lesson observation schedules to check how teachers were using effective teaching methods in their lessons. The lesson being observed was checked for either the presence or absence of items being investigated. At the end, the observation checklist for each teacher being observed was scored and frequency tables created.

The qualitative data from interviews was analysed using the content analysis technique and organised into categories that emerged from this process. This method helped the researcher identify patterns, ideas and themes that emerged from the data (Neuman, 2011). The data were first transcribed verbatim and coded, then analysed using identified themes from the participants' views. The researcher then divided the text data into meaningful inductive categories guided by the research objectives and the interview themes. All the collected data was analysed and interpreted, question by question.

3.9 RESEARCH ETHICS

Firstly, the researcher obtained ethical clearance from the University of Namibia Postgraduate Studies Committee through the Faculty of Education. The permission letter to carry out the study was sought from the Ministry of Education through the Permanent Secretary, the Oshana Regional Director of Education and the school principals, Grade 12 Physical Science teachers as well as the Grade 12 Physical Science advisory teacher in the Oshana Educational Region. Before the collection of data, the participants received full information about the purpose of the study and were assured that participation was on a voluntary basis. They were also informed of their right to withdraw from the study at any time if they wished, without recrimination.

All the participants' information, as well as the school names, were and shall be treated with the upmost confidentiality. Pseudonyms were used to ensure that participants were protected from any potential harm that might arise from this study. Furthermore, the collected data was analysed according to the information provided by the participants in the study. The raw data in the form of questionnaires, observation schedules and the audio recorded interviews would be and shall be kept by the researcher in a secure place for a period of two years, after which it will be destroyed.

3.10 SUMMARY

This chapter has focused on the methodology used in the study to collect data from the participants. The research design, population, sample and sampling procedures, the research instruments, pilot study, data collection procedures, data analysis and ethical considerations were described. The research instruments used in the data collection were

also described. The account of how the research instruments were piloted and how all possible amendments were made to refine the final version of the instruments were also discussed. The ethical issues were described. The next chapter presents the research results, discussion and findings of the study.

CHAPTER 4

PRESENTATION OF RESEARCH RESULTS AND DISCUSSIONS

4.1 INTRODUCTION

This chapter presents the data analysis, interpretation and discussion of the findings from the study. The fundamental aim was to investigate the factors affecting the effective teaching of Grade 12 Physical Science Ordinary Level in selected secondary schools in the Oshana Educational Region. The results are presented according to the research objectives given in Chapter 1. Apart from providing the factors affecting the effective teaching of Grade 12 Physical Science Ordinary Level in selected secondary schools, this chapter also provides a summary of the findings, setting the contents for Chapter 5 which provides the study's summary, conclusions as well as recommendations.

4.2 SECONDARY SCHOOLS CHARACTERISTICS

A total of eight secondary schools participated in this study. All the schools accommodated Grade 8-12 learners and had running water and electricity. Seven out of the eight schools had no hostels. Only two of the participated schools had a library. Table 2 (below) shows a list of the secondary schools as well as the total number of the Grade 12 Physical Science teachers per school who participated in this study.

Table 2: Physical Science teachers who participated in this study

School name	Number of teachers
School **A**	1
School **B**	2
School **C**	2
School **D**	2
School **E**	1
School **F**	2
School **G**	2
School **H**	2
Total	**14**

The table shows that 6 secondary schools had 2 Grade 12 Physical Science teachers each, while 2 secondary schools had 1 Physical Science teacher each.

4.3 QUALIFICATIONS OF THE GRADE 12 PHYSICAL SCIENCE TEACHERS, SCHOOL PRINCIPALS AND ADVISORY TEACHER

The following are the qualifications of the teachers.

4.3.1 Qualifications of the Grade 12 Physical Science teachers

The teachers who participated in this study had different qualifications (see Table 3).

Table 3: **Qualifications of the Physical Science teachers**

Qualifications	Number of teachers
Advanced Certificate in Education (ACE)	1
Bachelor of Education degree (B.Ed)	3
Basic Education Teacher Diploma (BETD)	7
BETD plus Mathematics and Science Teachers Extension Program (MASTEP) (Diploma)	1
Higher Education Diploma (HED)(Secondary)	2
Total	**14**

Table 3 shows that all the Grade 12 Physical Science teachers who participated in this study had teaching qualifications. One of the teachers had ACE, three had a BEd, seven

had a BETD, one a BETD plus MASTEP, while the other two had HEDs. All 14 teachers had relevant teaching qualifications, therefore, their views, provided in the following sections, on teaching the Grade 12 Physical Science should be relevant.

4.3.2 Qualifications of the school principals

The school principals who participated in this study had different qualifications (see Table 4).

Table 4: Qualifications of the school principals

Qualifications	Number of school principals
Advanced Certificate in Education (ACE)	1
Bachelor of Education degree (B.Ed)	2
Basic Education Teacher Diploma (BETD)	1
Higher Education Diploma (HED) (secondary)	2
Master of Education (M.Ed)	1
Master of Business Administration (MBA)	1

Table 4 shows that 7 school principals who participated in this study had teaching qualifications and only 1 with non-teaching qualification. These findings indicate that the majority (7 out of 8) of the school principals were qualified. All principals, with the exception of one, had relevant teaching qualifications, therefore their views on the teaching of Grade 12 Physical Science might be relevant.

4.3.3 Qualifications of the advisory teacher

A male advisory teacher for Physical Science in the Oshana Educational Region completed the questionnaire. He held a Bachelor of Education degree (BEd) teaching qualification.

The next section presents the results and discussions of the study, starting with the first research objectives.

4.4 RESEARCH OBJECTIVE ONE: TO DETERMINE THE VIEWS ON FACTORS AFFECTING THE EFFECTIVE TEACHING OF GRADE 12 PHYSICAL SCIENCE NAMIBIA SENIOR SECONDARY CERTIFICATE ORDINARY LEVEL IN THE OSHANA EDUCATIONAL REGION

In order to gather data for research objective one, the researcher made use of the questionnaires (see Appendices 6, 7 and 8), interviews (see Appendices 9 and 10) and the classroom observations (see Appendix 11). Results from the participants' questionnaires are presented in sections 4.4.1; 4.5 and 4.6 below.

4.4.1 Results from the Grade 12 Physical Science teachers' questionnaire

A total of 14 questionnaires (see Appendix 6) were distributed to the Grade 12 Physical Science teachers in the selected secondary schools in the Oshana Educational Region. All the 14 questionnaires were completed and collected for analysis by the researcher. The questionnaire included statements that were answered according to the three-point Likert scale i.e., *Agree, Disagree* and *Not Sure*. The teachers were asked to indicate the extent to which they agreed, disagreed or were not sure for each statement regarding the factors they perceived affecting the effective teaching of Grade 12 Physical Science Ordinary Level. The perceived factors were: teachers' years of Physical Science teaching experience; teacher-learner interactions; teachers' content knowledge; teachers' commitments, learners' attitude toward learning the Grade 12 Physical Science; availability of resources, teaching of Grade 12 Physical Science curriculum; learners' socio-economic conditions and teachers' support to learners. These are provided in the following sections.

4.4.1.1 Teachers' years of Physical Science teaching experience

In order to determine the teaching experience of the Grade 12 Physical Science teachers, and its relevance to teaching Physical Science Ordinary Level at secondary school level, teachers were asked to indicate their teaching experience in terms of the number of years. The levels of teaching experience were grouped into categories of five year intervals. The responses are summarised in Table 5 (below).

Table 5: Teachers' years of Physical Science teaching experience

Teaching experience (in years)	**Number of teachers**
1-5 yrs	8
6-10 yrs	4
11-15 yrs	-
16-20 yrs	2
Total	**14**

Table 5 shows that 8 teachers had 1 to 5 years of teaching experience; 4 teachers had 6 to 10 years teaching experience; while the other 2 had 16 to 20 years teaching experience. These findings seem to indicate that 8 out of 14 of the Grade 12 Physical Science teachers in the selected schools had fewer years of teaching experience compared to the others that participated in this study.

4.4.1.2 Teachers' views on the teacher-learner interactions in the classroom

Table 6 (below) presents the results of teachers' views on the teacher-learner interactions in the Grade 12 Physical Science Ordinary Level classrooms.

Table 6: **Teacher-learner interactions in the classroom**

	Responses		
Statements	**Disagree**	**Not Sure**	**Agree**
2.1 Allow learners to ask questions during teaching.	0	0	13
2.2 Give learners the opportunity to evaluate their own work (e.g., marking their own class activities, homework).	1	1	12
2.3 Allow learners to teach one another in my class (e.g., learner who understands a certain topic may be asked to teach others).	1	2	10

Table 6 shows that 13 of the Grade 12 Physical Science teachers agreed that they allowed learners to ask questions during teaching. IT also shows that 12 teachers agreed that they gave learners the opportunity to evaluate their own work, marking their own class activities and homework.

Furthermore, when teachers were asked whether they allowed learners to teach one another in the class, for example, a learner who understands a certain topic better may be asked to teach other learners, because some learners learn better from their peers than from the teacher, 10 teachers agreed, 1 disagreed and 2 were not sure.

4.4.1.3 Teachers' views on their content knowledge of Physical Science Ordinary Level

The results presented in Table 7 (below) show the Grade 12 Physical Science teachers' views on their content knowledge of Physical Science Ordinary Level. The teachers were asked to choose from Agree, Disagree or Not Sure.

Table 7: **Teachers' views on their content knowledge of Physical Science**

	Responses		
Statements	**Disagree**	**Not sure**	**Agree**
3.1 My lesson introduction engages learners and directs them toward the lesson objectives.	0	2	12
3.2 I understand all the concepts in Physical Science Ordinary Level to explain to my learners.	0	2	11
3.3 My English is good enough to make my learners understand Physical Science Ordinary Level topics.	0	2	11
3.4 It is difficult to prepare my Physical Science Ordinary Level lesson plans in advance for the lesson presentation.	11	1	1
3.5 I find it difficult to identify appropriate class activities that fit the syllabus' basic competencies.	9	4	0
3.6 I do not have enough Grade 12 Physical Science knowledge to guide my learners in their learning.	10	3	0
3.7 I find it difficult to use authentic (real-life) examples from the environment when teaching Physical Science (e.g., fire wood provides energy to cook food we eat).	10	2	1
3.8 I know how to use examination reports in my teaching of Physical Science content.	1	0	13
3.9 I cannot handle some of the experiments in the syllabus.	8	0	5

As Table 7 indicates, the majority (12 out of 14) of the Grade 12 Physical Science teachers agreed that their lesson introductions engaged all learners and directed them toward the lesson objectives, while 2 teachers indicated that they were not sure. When teachers were presented with the statement "I understood all the concepts in the Grade 12 Physical Science Ordinary Level to explain it to my learners", 11 agreed and only 2 indicated that they were not sure. This finding implies that most of the Grade 12 Physical Science teachers who participated in this study had a good understanding of the subject, which enabled them to assist their learners to better understand the Physical Science content.

Furthermore, the majority (11 out of 13) of the teachers agreed that their English was good enough to make the learners understand Grade 12 Physical Science Ordinary Level topics, while only 2 were not sure. Moreover, when teachers were asked whether they found it difficult to prepare their Grade 12 Physical Science Ordinary Level lesson plans in advance for their lessons, only 1 agreed with the statement, 11 teachers disagreed, and 1 teacher

was not sure. This result reveals that the majority of the teachers had no difficulties with the preparation of their lessons in advance.

In addition, Table 7 also shows that 9 of the teachers disagreed that they found it difficult to identify appropriate class activities that were in line with the syllabus' basic competencies, while the other 4 were not sure. It appears that teachers did not experience any difficulties in identifying appropriate class activities that could suit the syllabus' basic competencies. When teachers were presented with the statement "I do not have enough Grade 12 Physical Science knowledge to guide my learners in their learning", a total of 10 disagreed, while the other 3 were not sure.

The majority (10 out of 13) of the teachers disagreed that they found it difficult to use real life examples in their teaching, 2 teachers were not sure, and only 1 agreed with the statement. With regards to the use of examination reports in Physical Science teaching, only 1 teacher disagreed while the remaining 13 teachers agreed with the statement. This suggests that the majority (13 out of 14) of the teachers who participated in this study knew how to use examination reports to help their learners understand how to handle examination questions. However, 8 teachers disagreed and 5 agreed with the statement "I cannot handle some of the experiments in the syllabus". Hence, one could assume that most of the teachers could handle most of the experiments prescribed in the Grade 12 Physical Science Ordinary Level syllabus.

4.4.1.4 Teachers' views on their learners' attitudes toward learning Physical Science Ordinary Level

The views provided by the Grade 12 Physical Science teachers on their learners' attitudes toward learning Physical Science Ordinary Level in their secondary schools are presented in Table 8 (below).

Table 8: **Teachers' views on their learners' attitudes toward learning Physical Science**

	Responses		
Statements	**Disagree**	**Not sure**	**Agree**
4.1 Most of my learners are willing to learn Physical Science Ordinary Level.	6	1	7
4.2 Most of my learners in my class are disciplined.	5	2	6
4.3 Most of my Grade 12 learners have poor Physical Science background from lower grades.	1	5	7
4.4 Most of my learners do not pay attention to me during Physical Science lessons.	10	0	4
4.5 Grade 12 learners believe that Physical Science Ordinary Level is difficult.	5	4	4
4.6 Most Grade 12 learners do not take Physical Science Ordinary Level work seriously.	2	2	10
4.7 I experience disciplinary problems among my Grade 12 learners during practical work in the laboratory.	5	3	5
4.8 Few of my Grade 12 learners pay attention during practical work in the laboratory.	5	2	7

As Table 8 shows, 7 of the Grade 12 Physical Science teachers agreed that most of their learners were willing to learn Physical Science Ordinary Level, 6 disagreed and 1 was not sure. Teachers were presented with the statement "Most of the learners in my class are disciplined", 6 teachers agreed, 5 disagreed and 2 were not sure. Seven teachers agreed that most of their Grade 12 learners had poor Physical Science backgrounds from lower grades, while 1 teacher disagreed and 5 were not sure. These findings reveal that some of the teachers were of the view that their Grade 12 learners were not willing to learn Physical Science and they had poor Physical Science backgrounds from lower grades.

Table 8 also shows that the majority (10 out of 14) of teachers disagreed that most of their learners did not pay attention to them during Physical Science lessons, while 4 teachers

agreed. Similarly, the majority (10 out of 14) of teachers agreed that most of their Grade 12 learners did not take Physical Science Ordinary Level work seriously, while 2 disagreed and 2 were not sure. This result indicates that the majority of Grade 12 Physical Science teachers who participated in this study were of the opinion that their learners were not serious about studying Physical Science Ordinary Level. Furthermore, a total of 7 teachers agreed that some of the Grade 12 learners paid attention during practical work in the laboratory, while 5 disagreed and 2 teachers were not sure.

4.4.1.5 Teachers' views on the availability of teaching and learning resources

The findings on the views provided by the teachers on the availability of teaching and learning resources of the Grade 12 Physical Science Ordinary Level in their schools are presented in Table 9 (below).

Table 9: Teachers' views on the availability of resources

	Responses		
Statements	**Disagree**	**Not sure**	**Agree**
5.1 I have adequate teaching and learning materials for Physical Science Ordinary Level (e.g., reference textbooks and past examination question papers).	2	2	9
5.2 We have Physical Science laboratory at our school.	1	1	11
5.3 The laboratory has all equipment and resources (e.g. chemicals, test-tubes, and measuring cylinders).	7	2	5
5.4 All my Grade 12 learners have their own textbooks (not sharing textbooks).	3	0	11
5.5 There is adequate furniture in my classroom.	2	3	9
5.6 I have my own Physical Science classroom.	7	1	6

Table 9 indicates that 9 out of 13 teachers agreed that they had adequate teaching and learning materials for Physical Science Ordinary Level, for example reference textbooks and past examination question papers, while 2 disagreed and the other 2 teachers were not sure. Table 9 also shows that the majority (11 out of 13) of teachers agreed that they had

Physical Science laboratories at their schools, while 1 disagreed and 1 teacher was not sure.

With regards to the availability of all laboratory equipment at the schools, a total of 5 teachers agreed, 7 disagreed, while 2 teachers were not sure. In the same vein, the majority (11 out of 14) of teachers agreed that all their learners had their own Physical Science Ordinary Level textbooks, while 3 disagreed with the statement. This suggests that many secondary schools participated in this study, and their learners were not sharing textbooks as each had a textbook. However, their school laboratories did not have all the equipment and resources to use in teaching the Grade 12 Physical Science Ordinary Level practical work.

Furthermore, a total of 9 teachers agreed with the statement that there was adequate furniture for learners in their classrooms, while 2 teachers disagreed and 3 were not sure. Table 9 also shows that, 6 teachers agreed and 7 teachers disagreed that they had their own Physical Science classrooms at their schools, while only 1 teacher was not sure. It is clear from the findings that the Grade 12 Physical Science teachers who participated in this study did not have specific classrooms solely for Physical Science. This might negatively affect the effective teaching of Physical Science to take place, because the teachers might not be able to organise the sitting arrangement in the manner that could accommodate various teaching methods, such as group work that promote interactions among learners.

4.4.1.6 Teachers' views on the teaching of Grade 12 Physical Science Ordinary Level curriculum

The views provided by the Grade 12 Physical Science teachers on the teaching of Grade 12 Physical Science Ordinary Level curriculum in their schools are presented in Table 10 (below).

Table 10: **Physical Science teachers' views on the teaching of Grade 12 Physical Science Ordinary Level curriculum**

	Responses		
Statements	**Disagree**	**Not sure**	**Agree**
6.1 Time allocated for Physical Science Ordinary Level lessons on my timetable is not enough.	5	0	9
6.2 Double periods for Physical Science Ordinary Level are not available on my timetable.	10	0	4
6.3 Remedial classes for Physical Science Ordinary Level are not scheduled on my timetable.	4	2	8
6.4 Most of the Physical Science Ordinary Level textbooks that I use are not matching with the Namibian context.	12	0	2
6.5 My Physical Science classrooms are overcrowded for me to assist all learners during lessons.	6	1	7
6.6 I have too many Physical Science lessons per week.	10	0	4
6.7 Physical Science teachers are not enough at our school.	8	0	6

Table 10 shows that majority (9 out of 14) of the teachers agreed that time allocated for Physical Science Ordinary Level lessons on their timetable was enough, while 5 teachers disagreed with the statement. On the point of whether Grade 12 teachers had remedial classes for Grade 12 Physical Science Ordinary Level learners on their timetable, 8 teachers agreed, while 4 disagreed and 2 were not sure.

The teachers were presented with the statement; "Most of the Physical Science Ordinary Level textbooks that I use are not matching with the Namibian context". The majority (12 out of 14) disagreed, while 2 agreed with the statement. This implies that the Grade 12 Physical Science Ordinary Level textbooks were matching with the Namibian context.

When presented with the statement, “My Physical Science classrooms are overcrowded for me to assist all learners during lessons”, 7 teachers agreed, while 6 disagreed and only 1 was not sure

4.4.1.7 Physical Science teachers’ views on social-economic conditions of the learners

The views provided by the Grade 12 Physical Science teachers on the socio-economic conditions of the learners are presented in Table 11 (below).

Table 11: **Physical Science teachers’ views on the social-economic conditions of the learners**

	Responses		
Statements	**Disagree**	**Not sure**	**Agree**
7.1 Some of my Grade 12 Physical Science learners come from poor family background.	0	3	11
7.2 The home environment for some Grade 12 learners is not conducive for studying (e.g. examinations).	1	2	11
7.3 Some Grade 12 Physical Science learners cannot afford to pay for the hostel and school fees.	1	2	10
7.4 Some Grade 12 Physical Science learners are frequently absent from school due to household work.	3	4	7

Table 11 indicates that the majority (11 out of 14) teachers agreed that some of the learners in their classrooms came from poor family backgrounds, while 3 teachers were not sure. Teachers were presented with the statement, “The home environment for some Grade 12 learners is not conducive for studying”. The majority (11 out of 14) of the teachers agreed, while only 1 disagreed and 2 teachers were not sure. It appears that the homes of some of the learners in the Oshana Educational Region were not conducive for studying. From the results it is clear that some of the learners came from poor home environments that were not conducive to learning.

Similarly, the majority (10 out of 13) teachers agreed, 1 disagreed, while 2 were not sure about the statement "Some Grade 12 Physical Science learners cannot afford to pay for the hostel and school fees". In addition, 7 of the teachers agreed that some Physical Science [NSSC] Ordinary Level learners were frequently absent from school due to household work, while 3 teachers disagreed and the remaining 4 indicated that they were not sure of the statement. From the results, it can be assumed that learners' absenteeism could negatively affect effective teaching.

4.4.1.8 Physical Science teachers' views of their commitments toward teaching

The results presented in Table 12 (below0, indicate how the Grade 12 Physical Science teachers rated themselves in terms of their professional conduct and their commitment toward the teaching of Physical Science Ordinary Level.

Table 12: **Physical Science teachers' views of their commitments toward teaching**

	Responses		
Statements	**Disagree**	**Not sure**	**Agree**
8.1 I come to Physical Science lesson on time most of the time.	0	0	14
8.2 I give class activities after every lesson	4	3	7
8.3 I give a test after every chapter taught.	0	0	13
8.4 I mark all my learners' work on time.	1	2	11
8.5 I provide feedback on time to my learners.	0	0	13
8.6 I finish the scheme of work every term on time.	3	2	9
8.7 I finish the syllabus before the final examinations start, every year.	0	0	13
8.8 I do revision with my learners always before every final examination starts.	1	1	12

Table 12 shows that all 14 Grade 12 Physical Science teachers who participated in this study agreed that they attended their lessons on time most of the time. A total of 7 out of 14 teachers agreed with the statement that they gave class activities or homework after every lesson, while 4 teachers disagreed and 3 were not sure. The majority (13 out of 13) of the teachers agreed that they gave tests after every chapter they taught.

Similarly, the majority (11 out of 14) of the teachers also agreed that they marked all their learners' work on time, while 1 teacher disagreed and 2 were not sure. Although these findings seem to indicate that the Grade 12 Physical Science teachers marked all their learners' work on time, these findings are contrary to the lesson observations conducted, which discovered that the majority of the Grade 12 Physical Science teachers did not mark their learners' work consistently.

Table 12 also shows that the majority (13 out of 13) of the teachers agreed with the statement that they finished their syllabus before the final examinations every year. Furthermore, the majority (12 out of 14) of teachers also agreed that they always had revisions with their learners before every final examination starts, while 1 teacher disagreed and 1 indicated not sure. Although one cannot draw conclusion yet, it appears that teachers who participated in this study seemed to believe it was important to finish the syllabus early. The reasons advanced for this were that: 1) it gave them time to reflect on what they taught their learners; and 2) it afforded them time to do revision.

4.4.1.9 Views on Physical Science teachers' support to learners

The results presented under this section give the Grade 12 Physical Science teachers' views of the support they provided to the Grade 12 Physical Science Ordinary Level learners in their secondary schools to enhance effective teaching. Their responses are presented in Table 13 (below).

Table 13: **Physical Science teachers' views on learner support**

	Responses		
Statements	**Disagree**	**Not sure**	**Agree**
9.1. I make sure that all my learners have relevant textbooks and resources (e.g. latest syllabus).	0	2	12
9.2 I provide short well planned notes to my learners.	0	0	14
9.3 I provide clear instructions and guidance for activities and homework.	0	1	12
9.4 I make sure all class activities and homework are supporting the achievement of basic competencies as indicated in the syllabus.	0	1	13
9.5 I provides appropriate feedback to my learners both orally and written.	0	0	13
9.6 I make sure all my learners have done corrections on mistakes in all previous work.	1	1	12
9.7 I use different teaching methods in teaching Physical Science that support effective teaching.	1	2	11
9.8 I use variety of activities in my teaching (e.g., presentations, role plays, written work, practical work)	1	2	11

As Table 13 shows, the majority (12 out of 14) of the teachers agreed that they made sure that all their learners had the relevant textbooks and resources, while 2 teachers were not sure. Table 13 also shows that, all 14 teachers agreed with the statement that they provided well-planned notes to their learners. These results indicate that the Grade 12 Physical Science teachers who participated in this study preferred giving short notes to their learners during teaching rather than allowing them to explore what they had learned on their own in order to construct their own subject content knowledge.

Likewise, when the teachers were asked to indicate whether they made sure all class activities and homework supported the achievement of basic competencies, as indicated in the syllabus, 13 teachers agreed and only 1 was not sure. A total of 13 teachers agreed that they provided appropriate feedback to their learners, both orally and in writing.

The majority (12 out of 14) of the teachers agreed that they made sure that all their learners had made corrections on the mistakes in all previous work, while 1 disagreed and another 1 was not sure. Furthermore, 11 teachers agreed that they used different teaching

methods, in their teaching of Physical Science that supported effective teaching, while 1 disagreed and 2 were not sure.

4.5 RESULTS FROM THE SCHOOL PRINCIPALS' QUESTIONNAIRE

A total of 8 questionnaires (see Appendix 7) were distributed to the 8 school principals in the selected secondary schools in the Oshana Educational Region. All the 8 questionnaires were completed and were collected for analysis by the researcher. The questionnaires were answered according to the three Likert type scale, that is, *Agree, Disagree* and *Not Sure*. They were required to indicate whether they agreed, disagreed or were not sure with each statement about the factors affecting the effective teaching of Grade 12 Physical Science Ordinary Level. The perceived factors were: teacher-learner interactions; learners' attitudes toward learning Grade 12 Physical Science; availability of resources; teaching of Grade 12 Physical Science curriculum; socio-economic conditions of learners; teachers' commitments and teachers' support to learners.

4.5.1 The principals' views on teacher-learner interactions in the Physical Science classroom

The school principals' questionnaire had three statements on the Grade 12 Physical Science teachers' interaction with learners in teaching Physical Science Ordinary Level. Their responses are presented in Table 14 (below).

Table 14: The principals' views on the teacher-learner interactions

	Responses		
Statements	**Disagree**	**Not Sure**	**Agree**
1.1 Teacher allows learners to ask questions during teaching.	1	1	6
1.2 Teacher gives learners the opportunity to evaluate their own work (e.g. marking their own class activities, homework).	5	1	2
1.3 Teacher allows learners to teach one another in class (e.g. learner who understands a certain topic may ask to teach others).	4	1	3

As Table 14 shows, the majority (6 out of 8) of the school principals agreed that teachers allowed the Physical Science Ordinary Level learners to ask questions during teaching, while only 1 disagreed and 1 was not sure. Table 14 also shows that 2 school principals agreed that the teachers gave learners the opportunity to evaluate their own work, while 5 disagreed and 1 was not sure. Table 14 further shows that only 3 principals agreed, 4 disagreed and 1 was not sure whether teachers allowed learners to teach one another in their classes.

4.5.2 The principals' views of the learners' attitudes toward learning Physical Science

The questionnaire had six statements on the Grade 12 Physical Science learners' attitudes toward learning Physical Science Ordinary Level. The principals' responses are presented in Table 15 (below).

Table 15: The principals' views on the learners' attitudes toward learning Physical Science

	Responses		
Statements	**Disagree**	**Not sure**	**Agree**
2.1 Most of learners are willing to learn Physical Science Ordinary Level at my school.	5	3	0
2.2 Most of learners in my school are disciplined.	4	2	2
2.3 Most of Grade 12 learners at our school have poor Physical Science background from lower grades	1	2	5
2.4 Most of learners pay attention to their teachers during Physical Science lessons.	6	0	2
2.5 Most Grade 12 learners believe that Physical Science is difficult	4	3	1
2.6 Most Grade 12 learners do not take Physical Science work seriously.	5	0	3

Table 15 shows that 5 school principals disagreed that the Grade 12 Physical Science learners were willing to learn Physical Science Ordinary Level, while only 3 were not sure. However, 4 out of the 8 school principals also disagreed that most of the learners in their schools were disciplined, while 2 agreed and another 2 were not sure.

Five (5) school principals agreed that most of the Grade 12 learners at their schools had poor Physical Science background from lower grades, while only 1 disagreed and the other 2 were not sure. It was also found that only 2 school principals agreed and another 6 disagreed that most of the Grade 12 learners paid attention to their teachers during Physical Science lessons. Furthermore, 3 school principals agreed with the statement that most of the Grade 12 learners did not take Physical Science work seriously, while 5 school principals disagreed with the statement.

4.5.3 The principals' views on the availability of resources for teaching Physical Science

The information in Table 16 (below) presents the views of the school principals on the availability of the Grade 12 Physical Science Ordinary Level teaching and learning resources at their secondary schools.

Table 16: **Availability of Grade 12 Physical Science resources**

	Responses		
Statements	**Disagree**	**Not sure**	**Agree**
3.1 Teachers have adequate teaching and learning materials for Physical Science Ordinary Level (e.g. reference textbooks and past examination question papers, etc).	0	1	7
3.2 There is a Physical Science laboratory at your school.	1	0	7
3.3 The laboratory has all equipment and resources.	5	0	3
3.4 All the Grade 12 learners have their own textbooks (not sharing textbooks).	1	2	5
3.5 There is adequate furniture in classrooms for learners.	3	0	5
3.6 Teachers have their own Physical Science classrooms.	4	1	3

Table 16 shows that the majority (7 out of 8) of the school principals agreed that the Grade 12 Physical Science teachers at their secondary schools had adequate teaching and learning materials for Physical Science Ordinary Level, while 1 principal was not sure. Table 16 also shows that the majority (7 out of 8) of the principals agreed that the Physical Science laboratories were available at their schools and only 1 disagreed with the statement. Three (3) school principals agreed that their schools' laboratories had all the necessary equipment and resources and 5 disagreed with the statement. These findings clearly reveal that secondary schools that participated in this study were poorly equipped with necessary resources for teaching Physical Science.

The majority (5 out of 8) of the school principals agreed that all the Grade 12 Physical Science Ordinary Level learners had their own textbooks, while 1 disagreed and 2 were not sure. In addition, 5 school principals agreed and 3 disagreed with the statement; "There is

adequate furniture in classrooms for learners". Furthermore, 3 principals agreed, while 4 disagreed that teachers had their own Physical Science classrooms at their secondary schools and 1 was not sure.

4.5.4 The principals' views on the teaching of Grade 12 Physical Science Ordinary Level curriculum

The information provided in Table 17 (below) shows the views of the school principals on the teaching of Grade 12 Physical Science Ordinary Level curriculum.

Table 17: **The school principals' views on the teaching of Grade 12 Physical Science Ordinary Level curriculum**

	Responses		
Statements	**Disagree**	**Not sure**	**Agree**
4.1 Time allocated for Physical Science Ordinary Level lessons on the timetable is not enough.	0	2	6
4.2 Remedial classes for Physical Science Ordinary Level are not scheduled on timetable.	2	2	4
4.3 Most of the Physical Science textbooks used by teachers are not matching with the Namibian context.	5	2	1
4.4 Most of Physical Science classrooms are overcrowded.	2	1	5
4.5 Teachers have too many Physical Science lessons per week.	5	2	1
4.6 Physical Science teachers are not enough at our school.	5	0	3

Table 17 indicates that the majority (6 out of 8) of the school principals agreed that the time allocated for Grade 12 Physical Science Ordinary Level lessons on the Grade 12 Physical Science teachers' timetable was not enough, while 2 were not sure. It also indicates that only 4 school principals agreed that remedial classes for Grade 12 Physical Science Ordinary Level were not scheduled on the teachers' timetable, while 2 disagreed and the other 2 were not sure.

In the same vein, the majority (5 out of 8) of the school principals disagreed that most of the Grade 12 Physical Science Ordinary Level textbooks used by the teachers at their

secondary schools did not match with the Namibian context, while only 1 agreed and the other 2 school principals were not sure. Table 17 also shows that the majority (5 out of 8) of the school principals agreed that most of the Grade 12 Physical Science Ordinary Level classrooms were overcrowded, while 2 disagreed and only 1 school principal was not sure. Furthermore, 5 school principals disagreed that teachers had too many Physical Science Ordinary Level lessons per week, while 1 agreed and 2 were not sure. In addition, 5 principals disagreed, while 3 agreed that the Grade 12 Physical Science teachers were not enough at their secondary schools.

4.5.5 The principals' views on the socio-economic conditions of the learners

The information presented in Table 18 (below), shows the school principals' views on the socio-economic conditions of the Grade 12 Physical Science Ordinary Level learners in their secondary schools.

Table 18: **The principals' views on the socio-economic conditions of the learners**

	Responses		
Statements	**Disagree**	**Not Sure**	**Agree**
5.1 Some Grade 12 Physical Science learners at my school come from poor family background.	0	2	6
5.2 The home environment for some Grade 12 learners is not conducive for studying (e.g. Examinations).	0	1	7
5.3 Some Grade 12 Physical Science learners cannot afford to pay for the hostel and school fees.	1	2	5
5.4 Some Grade 12 Physical Science learners absent from school due to household work.	1	3	4

Table 18 shows that 6 school principals agreed that some Grade 12 Physical Science Ordinary Level learners at their secondary schools came from poor family backgrounds and only 2 were not sure. The table also showed that the majority (7 out of 8) of the principals agreed that the home environments of some learners were not conducive for studying, while 1 was not sure.

The principals were also presented with the statement "Some Grade 12 Physical Science learners cannot afford to pay for the hostel and school fees", to which 5 agreed, 1 disagreed and 2 were not sure. Furthermore, 4 principals agreed that some learners were absent from school due to household work, while 1 disagreed and 3 were not sure. It is clear that since not all learners were present in the classrooms when teachers were teaching this could negatively affect the effective teaching to take place.

4.5.6 The principals' views on the teachers' commitment toward teaching

Table 19 (below) shows the views of the school principals on the Grade 12 Physical Science teachers' commitments and their professional conduct toward teaching Grade 12 Physical Science Ordinary Level.

Table 19: **The principals' views on the teachers' commitments toward teaching**

	Responses		
Statements	**Disagree**	**Not Sure**	**Agree**
6.1 Teachers come to Physical Science lessons on time most of the time.	4	0	3
6.2 Teachers give class activities after every lesson.	5	1	2
6.3 Teachers give a test after every chapter taught.	3	2	3
6.4 Teachers mark all learners' work on time.	4	0	4
6.5 Teachers provide feedback on time to learners.	4	2	2
6.6 Teachers finish the Scheme of Work every term on time.	4	0	4
6.7 Teachers finish the Physical Science Ordinary Level syllabus before the final examinations start, every year.	1	0	7
6.8 Teachers do revision with learners always before every final examination starts.	1	0	7
6.9 Teachers use different teaching methods that promote effective teaching of Physical Science	4	1	3

Table 19 indicates that 3 school principals agreed that the Grade 12 Physical Science teachers attended to their lessons on time most often, while 4 disagreed with the statement. This result implies that some of the Grade 12 Physical Science teachers were not attending

to their lessons on time and this might negatively affect the effective teaching, because teachers could not have enough time to take all teaching activities into consideration.

The majority (7 out of 8) of the principals agreed that the teachers finished the Physical Science Ordinary Level syllabus before the start of the final examinations every year, while 1 disagreed with the statement. Table 19 also indicates that the majority (7 out of 8) of the school principals agreed that the teachers always had revisions with the learners before the start of every final examination, while 1 disagreed with the statement. Additionally, 4 school principals disagreed, while 3 agreed that teachers used different teaching methods that promoted effective teaching of Physical Science and only 1 was not sure.

4.5.7 The principals' views on teachers' support to learners

The school principals were asked to indicate their agreement with given statements by choosing from *Agree, Disagree* or *Not Sure* on the support the Grade 12 Physical Science teachers provided to their learners to improve effective teaching. Their responses are presented in Table 20 (below).

Table 20: **The principals' views on the teachers' support to learners**

	Responses		
Statements	**Disagree**	**Not sure**	**Agree**
7.1. Teachers ensure that all learners have relevant textbooks and resources (e.g. latest syllabus).	0	1	7
7.2 Teacher provides short, well-planned notes to learners.	1	1	6
7.3 Teachers provide clear instructions and guidance for activities and homework.	1	6	1
7.4 Teachers ensure that all class activities and homework support the achievement of basic competencies as indicated in the syllabus.	1	1	6
7.5 They provides appropriate feedback to the learners both orally and written.	1	2	5
7.6 Teachers ensure all learners have done corrections on mistakes in all previous work.	1	2	5
7.7 I conduct class visit to my Grade 12 Physical Science teacher every week.	8	0	0

Table 20 reveals that 7 of the school principals agreed that the Grade 12 Physical Science teachers made sure that all the Physical Science Ordinary Level learners had relevant textbooks and other resources, 1 was not sure. Table 20 also shows that 6 school principals agreed that the teachers provided short, well-planned notes to their learners, while 1 disagreed and 1 was not sure.

A total of 6 school principals agreed that teachers made sure that all their class activities and homework supported the achievement of basic competencies, as prescribed in the Physical Science Ordinary Level syllabus; while 1 principal disagreed, and 1 was not sure. Nonetheless, when the principals were presented with the statement "Teachers provided appropriate feedback to the learners, both orally and written", 5 agreed, while 1 disagreed and 2 were not sure.

Table 20 also indicates that all 8 principals disagreed with the statement that they conducted class visits to the Grade 12 Physical Science teachers every week.

4.6 RESULTS FROM THE ADVISORY TEACHER'S QUESTIONNAIRE

One questionnaire (see Appendix 8) was handed out to the advisory teacher for Physical Science in the Oshana Educational Region. The questionnaire included a number of statements that were answered as, *Agree, Disagree* and *Not Sure.*

The advisory teacher was asked to indicate whether he agreed, disagreed or was not sure for each statement regarding the factors he perceived as affecting the effective teaching of Grade 12 Physical Science Ordinary Level. The perceived factors were centred on: teacher-learner interactions; teachers' content knowledge; teachers' competence in teaching, learners' attitude toward learning Physical Science, the availability of resources, and teaching of Grade 12 Physical Science curriculum, Physical Science teachers'

commitment toward teaching, and teachers' support to learners. The results obtained from the questionnaire are presented in this section.

4.6.1 The advisory teacher's views on Physical Science teacher-learner interactions in the classroom

Table 21 (below) presents the results of the advisory teacher's views on the teacher-learner interactions in the Grade 12 Physical Science Ordinary Level classrooms.

Table 21: The advisory teacher's views on the Physical Science teacher-learner interactions

	Responses		
Statements	**Disagree**	**Not Sure**	**Agree**
1.1 Teachers allow learners to ask questions during teaching.	0	0	1
1.2 Teachers give learners the opportunity to evaluate their own work (e.g. marking their own class activities, homework).,	1	0	0
1.3 Teachers allow learners to teach one another in my class (e.g., learner who understands a certain topic may ask to teach others).	1	0	0

Table 21 shows that the advisory teacher agreed that teachers allowed the learners to ask questions during teaching, but he disagreed that teachers gave learners the opportunity to evaluate their own work, and also disagreed with the statement that the Grade 12 Physical Science teachers allowed learners to teach one another in their classes.

4.6.2 The advisory teacher's views on the content knowledge of the Physical Science teachers

The results presented in Table 22 show the advisory teacher's views on the content knowledge of the Grade 12 Physical Science teachers. He was asked to choose from Agree, Disagree or Not sure.

Table 22: Advisory teacher's views on the teachers' content knowledge of Physical Science

	Responses		
Statements	**Disagree**	**Not sure**	**Agree**
2.1 Teachers introduce lesson by engages learners and directs them toward the lesson objectives.	1	0	0
2.2 Teachers understand all the concepts in Physical Science Ordinary Level syllabus and they clearly explain to learners.	1	0	0
2.3 Teachers' English is good enough to make learners understand Physical Science Ordinary Level topics.	0	0	1
2.4 Teachers find it difficult to prepare Physical Science lesson plans in advance for presentation.	0	1	0
2.5 Teachers find it difficult to identify appropriate class activities that fit the syllabus' basic competencies.	0	0	1
2.6 Teachers do not have enough Grade 12 Physical Science knowledge to guide their learners in their learning.	0	1	0
2.7 Teachers find it difficult to use authentic (real-life) examples when teaching Physical Science (e.g., fire wood provides energy to cook food we eat).	0	0	1
2.8 Teachers know how to use examination reports in teaching of Physical Science content.	0	1	0
2.9 Some teachers cannot handle some of the experiments in the syllabus.	0	0	1

Table 22 indicates that the advisory teacher disagreed that the Grade 12 Physical Science teachers introduced their Physical Science Ordinary Level lessons by engaging their learners and directing them towards the lesson objectives. He also disagreed that the teachers in the region did not understand all the concepts in Grade 12 Physical Science Ordinary Level syllabus and they did not thoroughly explain the subject content to the learners. The advisory teacher agreed that the teachers' English usage was good enough to make learners understand Grade 12 Physical Science Ordinary Level topics.

Furthermore, the advisory teacher was not sure whether the teachers were finding it difficult to prepare Physical Science Ordinary Level lesson plans in advance for their lessons. When he was presented with the statement, "The teachers found it difficult to identify appropriate class activities that fit the Physical Science Ordinary Level syllabus' basic competencies", he agreed.

The advisory teacher was also not sure that the teachers had insufficient Physical Science Ordinary Level knowledge to guide their learners in their learning. He agreed that the teachers found it difficult to use authentic (real-life) examples when teaching Physical Science Ordinary Level. Furthermore, the advisory teacher was not sure "The teachers knew how to use examination reports in their teaching of the Physical Science Ordinary Level content".

4.6.3 The advisory teacher's views on the Physical Science teachers' competence in teaching

The results presented in Table 23 (below) indicate how the advisory teacher agreed or disagreed with the Grade 12 Physical Science teachers in terms of their competence toward teaching Grade 12 Physical Science Ordinary Level. The advisory teacher was asked to choose from *Agree, Disagree* or *Not sure* responses.

Table 23: Advisory teacher's views on the Physical Science teachers' commitment in teaching Physical Science

	Responses		
Statements	**Disagree**	**Not sure**	**Agree**
4.1Teachers come to Physical Science lessons on time most of the time.	1	0	0
4.2 Teachers give class activities after every lesson.	1	0	0
4.3 Teachers give a test after every chapter taught.	0	1	0
4.4 Teachers mark all learners' work on time.	1	0	0
4.5 Teachers provide feedback on time to learners.	1	0	0
4.6 Teachers finish the Scheme of Work every term on time.	1	0	0
4.7 Teachers do revision with learners always before every final examination starts.	0	0	1
4.8 Teachers use different teaching methods that promote effective teaching methods of Physical Science.	1	0	0

Table 23 indicates that the advisory teacher disagreed that teachers attended to their lessons on time most often, and he also disagreed that teachers gave class activities after every lesson. However, the advisory teacher was not sure that teachers gave a test after

every chapter taught. He also disagreed that the Physical Science teachers marked all the learners' work on time. Equally, the advisory teacher disagreed when presented with the statement; "Teachers provide feedback on time to learners".

Furthermore, he disagreed when presented with the statement "Teachers finish the Scheme of Work on time every term". He agreed with the statement that teachers always did revision with learners before every final examination. The advisory teacher also disagreed with the statement that most teachers used different teaching methods that promoted effective teaching of Physical Science.

4.6.4 Advisory teacher's views on the learners' attitudes toward learning Grade 12 Physical Science

The results presented in Table 24 (below) indicate how the advisory teacher responded to statement regarding the learners' attitudes toward learning Grade 12 Physical Science Ordinary Level. The advisory teacher was asked to choose from *Agree, Disagree* or *Not sure.*

Table 24: Advisory teacher's views on the Grade 12 learners' attitudes toward learning Physical Science

	Responses		
Statements	**Disagree**	**Not sure**	**Agree**
5.1 Most of learners are willing to learn Physical Science Ordinary Level in my region.	1	0	0
5.2 Most of Grade 12 learners have poor Physical Science background from lower grades.	0	0	1
5.3 Most of the learners do not pay attention to teachers during Physical Science lessons.	0	0	1
5.4 Grade 12 learners believe that Physical Science Ordinary Level is difficult.	0	1	0

According to Table 24 the advisory teacher disagreed that most of the learners were willing to learn Physical Science Ordinary Level in the region. He agreed that most learners had

poor Physical Science background from lower grades and that most of them did not pay attention to their teachers during lessons. Furthermore, he agreed with the statement "Most of the learners did not pay attention to teachers during Physical Science lessons".

4.6.5 The advisory teacher's views on the availability of resources

The responses provided by the Grade 12 Physical Science advisory teacher on the availability of the Grade 12 Physical Science resources in his region was presented in Table 25.

Table 25: Availability of Grade 12 Physical Science resources

	Responses		
Statements	**Disagree**	**Not sure**	**Agree**
6.1 Teachers have adequate teaching and learning materials for Physical Science Ordinary Level (e.g., reference textbooks and past examination question papers).	0	0	1
6.2 Schools are having Physical Science laboratories in the region.	0	0	1
6.3 The laboratory has all equipment and resources at schools.	1	0	0
6.4 All the Grade 12 learners have their own textbooks (not sharing textbooks).	1	0	0
6.5 There is adequate furniture in classrooms for learners at schools.	1	0	0
6.6 Teachers have their own Physical Science classroom at schools.	0	1	0

Table 25 shows that the advisory teacher agreed with the statement that the teachers had adequate teaching and learning materials for Grade 12 Physical Science Ordinary Level and that the schools in the region had Physical Science laboratories. The advisory teacher disagreed with the statement that the laboratories at schools in the region had all equipment and resources. The advisory teacher disagreed that all the learners had their own textbooks and that there was adequate furniture in classrooms for learners at the schools. Furthermore, the advisory teacher was not sure when presented with the statement; "The teachers in his region had their own Physical Science classroom at their schools".

4.6.6 The advisory teacher's views on the teaching of Grade 12 Physical Science Ordinary Level curriculum

The information provided by the Grade 12 Physical Science advisory teacher on the teaching of Grade 12 Physical Science Ordinary Level curriculum is presented in Table 26 (below).

Table 26: **Advisory teacher's views on the teaching of Grade 12 Physical Science Ordinary Level curriculum**

	Responses		
Statements	**Disagree**	**Not sure**	**Agree**
7.1 Time allocated for Physical Science Ordinary Level lessons on the timetable is not enough.	0	0	1
7.2 Remedial classes for Physical Science Ordinary Level are available on the timetable.	1	0	0
7.3 Most of the Physical Science Ordinary Level textbooks used by the teachers are not matching with the Namibian context.	0	0	1
7.4 Physical Science classrooms are overcrowded.	0	0	1
7.5 Teachers have too many Physical Science lessons per week.	0	1	0
7.6 Physical Science teachers are not enough at the schools in your region.	1	0	0

Table 26 indicates that the advisory teacher agreed that the time allocated for Grade 12 Physical Science Ordinary Level lessons on the timetable was not enough. Table 26 also indicates that the advisory teacher disagreed that remedial classes for Grade 12 Physical Science Ordinary Level were available on the timetable. He further agreed that most of the Grade 12 Physical Science Ordinary Level textbooks used by the teachers did not match with the Namibian context, opposing the views of the teachers and principals (see Tables 10 and 17). The advisory teacher was, nonetheless, in agreement with the statement that the Grade 12 Physical Science Ordinary Level classrooms in the region were overcrowded. This finding is in line with the findings of the lesson observations which revealed that in many secondary schools in the Oshana Educational Region had 42 to 51 learners in the classrooms (see sub-topic 4.8.1).

Furthermore, he was not sure whether "Teachers had too many Physical Science Ordinary Level lessons per week". Moreover, the advisory teacher disagreed that the teachers were not enough at the schools in the region.

4.6.7 The advisory teacher's views on Physical Science teachers' support to learners

The advisory teacher was asked to choose from *Agree, Disagree* or *Not sure* regarding the support the Grade 12 Physical Science teachers provided to their Physical Science Ordinary Level learners in order to improve effective teaching. The information is presented in Table 27 (below).

Table 27: **Advisory teacher's views on the Physical Science teachers' support to learners**

	Responses		
Statements	**Disagree**	**Not sure**	**Agree**
8.1. Teachers ensure that all the learners have relevant textbooks and resources (e.g., latest syllabus).	0	1	0
8.2 Teacher provides short, well-planned notes to learners.	1	0	0
8.3 Teachers provide clear instructions and guidance for activities and homework given to learners.	1	0	0
8.4 Teachers ensure that all class activities and homework are supporting the achievement of basic competencies in the syllabus.	0	0	1
8.5 Teachers provide appropriate feedback to their learners both orally and written.	0	1	0
8.6 Teachers ensure all learners have done corrections on mistakes in all previous work.	1	0	0
8.7 I conduct class visit to my Grade 12 Physical Science teacher very often.	0	0	1
8.8 I provide Grade 12 Physical Science Ordinary Level syllabus and Scheme of Work to teachers every year in my region.	0	0	1

Table 27 shows that the advisory teacher was not sure that the Grade 12 Physical Science teachers ensured that all the Physical Science Ordinary Level learners had relevant textbooks and other resources. He disagreed with the statement that the teachers provided short, well-planned notes to learners. Table 27 shows that the advisory teacher disagreed that teacher provided clear instructions and guidance for activities and homework.

Furthermore, the advisory teacher agreed with the statement that the teachers ensured that all class activities and homework supported the achievement of basic competencies in the syllabus. Moreover, the advisory teacher agreed with the statement that he conducted class visits for teachers regularly and provided the Grade 12 Physical Science Ordinary Level syllabus and Scheme of Work to teachers in the region every year. He also agreed with the statement that he helped the novice teachers with teaching the Grade 12 Physical Science Ordinary Level through workshops every term.

4.7 GRADE 12 PHYSICAL SCIENCE TEACHERS' AND ADVISORY TEACHER'S INTERVIEW RESULTS

In order to have a deeper understanding of the participants' views on the factors affecting the effective teaching of Grade 12 Physical Science, the teachers and the advisory teacher in the sample were interviewed by the researcher on a one-on-one basis. A total of 5 Grade 12 Physical Science teachers were interviewed in order to provide in-depth information which would further explain results obtained from the questionnaires.

The results that emerged from the interviews are presented under the following headings: overcrowded classrooms; lack of resources; learners' and teachers' attitudes toward teaching and learning Physical Science; teachers' experiences; time allocated for Physical Science lessons; learners' poor backgrounds of Physical Science; and the learners' poor English proficiency. These factors are discussed in the next sections.

4.7.1 Overcrowded classrooms

During the interviews with the Grade 12 Physical Science teachers and the advisory teacher, the interviewees felt that overcrowded classrooms was one of the factors affecting the use of effective teaching methods in teaching the Grade 12 Physical Science Ordinary Level in the Oshana Educational Region. In the interviews, 2 teachers stated that indiscipline among the learners and too many groups in the classroom was a result of having a large number of learners in the classrooms. Teacher SC, when remarking on the challenge of overcrowded classrooms during his teaching, said:

> *If you are to conduct a lesson on the measurement of temperature and you only have two thermometers for forty seven learners. How would you divide them among such large number of learners? It will be difficult for you. Otherwise if you make too many groups that will not work, because some learners will misbehave, they will be talking a lot and it will be very difficult to control them and not everybody could be paying attention and that is a challenge on its own* [09 September 2014].

During the interviews with the advisory teacher, he mentioned that: *One of the most hindering factors in making group work effective* [in the Oshana Region] *is certainly overcrowding of classes. Classes are overcrowded if you are dealing with a class of fifty learners and is actually not possible to apply this method, you will not be able to control or even the space in the classroom is not there* [12 September 2014].

The advisory teacher also mentioned that another factor affecting the use of problem-based learning method could be overcrowded classrooms and he said:

> *If the teacher is going to a class of forty to fifty learners every innovative in the minds is almost erased and preaching to them* [learners] *instead of engaging the learners in the lesson, because the first question is, If I engage, how many I*

> *engage* [in the lesson], *instead they* [teacher] *decide let me just talk to them and do what I know is right and I leave it there. Overcrowded classroom is definitely one of the major factors in the Oshana Region, because it can affect even the assessment, the teacher is scared of getting into a situation that requires assessment, because assessment means going through fifty scripts for five classes and fifty times five you know is not a good figure* [12 September 2014].

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. The advisory teacher also added that there were schools with some laboratory materials, still in their boxes, because either the teacher was not willing to take them out, or because he/she knew that even if the materials were taken out it would be impossible to effectively use them in the overcrowded classes.

The Advisory teacher concluded that:

> *The overcrowded classrooms are a problem in itself, because by using teaching methods, like group work which require constant supervision, it is very difficult to control learners due to large number of learners which can lead to some learners getting in groups to discuss soccer instead of the topic* [12 September 2014].

These results support what the teachers, school principals and the advisory teacher indicated in the questionnaires (see Table 10, 17 and 26). In all cases, the participants indicated that the Grade 12 Physical Science Ordinary level classrooms were overcrowded and that it was difficult for the teachers to assist all the learners during the lessons. These

findings suggest that the secondary schools which participated in this study had overcrowded classrooms which constrained the teaching of the Grade 12 Physical Science. Therefore, it is likely to be difficult for the teachers to employ the perceived effective teaching methods, such as group work, problem-based learning and practical work in their teaching processes.

4.7.2 Lack of resources

Another factor affecting the use of the perceived effective teaching methods highlighted by the participants was the lack of resources. The shortage of laboratory facilities and school hostels were experienced at the secondary schools that participated in this study. During the interviews with the teachers, at least four of the participants (three teachers and the advisory teacher) said that the lack of resources was a major factor affecting the effective teaching of the Grade 12 Physical Science Ordinary level in the Oshana Educational Region. During the interviews, Teacher SC highlighted that:

> *The first problem which we have is a lack of materials; our laboratories are poorly equipped with materials necessary to conduct practicals, which becomes a challenge in itself* [09 September 2014].

Teacher KF remarked:

> *Our laboratory is not that well equipped in terms of chemicals, therefore, it is hard for me to carry out the experiments. Some of the topics, for example, the Cathode Ray Oscilloscope and the Van de Graaf generator, most of our schools do not have these materials, as a results we are forced to teach using their pictures, but in reality you are supposed to carry out an experiment* [09 September 2014].

Teacher IK remarked:

> *I really do not ignore the practicals, because what I understand it is the most contributing factors to the better performance of the learners. It is like removing the shield from the eyes of the learners. If there are no materials for those types of experiments, than I will not do that practical, especially in my school* [11 September 2014].

Furthermore, Teacher IS remarked:

> *The availability of materials, our school laboratory does not have all equipment needed for experiment and practicals* [16 September 2014].

In addition, the advisory teacher remarked that:

> [In our region] *you come at some schools in the laboratories there is nothing, you only find some cylinders, few flasks there and when the teacher comes there he/she does not even know what to do in that class. What will I do? What practicals? The lack of laboratory equipment demoralizes the teachers* [16 September 2014].

Teacher KF remarked:

> *Our laboratory is not well equipped in terms of chemicals, Cathode Ray Oscilloscope and Van der Graaf generator* [09 September 2014].

Teacher IS remarked:

> *Our school laboratory does not have all equipment needed for experiment and practicals* [16 September 2014].

These findings were consistent with what the teachers, the principals and the advisory teacher indicated in their questionnaires (see Tables 9, 16 and 25). In all cases, the

participants indicated that the school laboratories did not have enough equipment or other resources.

4.7.3 The learners' attitudes toward learning Physical Science Ordinary Level

The third factor affecting the use of effective teaching methods in teaching the Grade 12 Physical Science Ordinary level in the Oshana Educational Region noted by the participants was the learners' attitudes toward learning Physical Science Ordinary Level. During the interviews with the teachers, three teachers mentioned that some learners had developed negative attitudes toward learning Physical Science Ordinary Level from their lower grades.

Teacher IK remarked that:

> *Many of the learners have these perceptions that the Grade Twelve Physical Science is difficult and some believe that, because they did not pass Physical Science since Grades Eight, Nine and Ten, they believe they cannot make it in Grade Twelve* [11 September 2014].

Teacher IS similarly remarked that:

> *Learners have wrong beliefs, like some of them beliefs that Physical Science is a very difficult subject, therefore, they lose interest in the subject* [16 September 2014].

Teacher KF also remarked that:

> *Some learners have bad concepts about science, due to lack of foundations* [09 September 2014].

This is consistent with what was indicated by the teachers in the questionnaire. Statement 4.1 in Table 8 of the teachers' questionnaire shows that six out of 14 of the teachers disagreed that most of their learners were willing to learn the Grade 12 Physical Science Ordinary Level. In the same vein, statement 4.6 in the same Table 8 also indicates that the majority (10 out of 14) of the teachers agreed with the statement which said that "Most Grade 12 learners did not take Physical Science Ordinary Level work seriously." One can, therefore, argue that if learners develop positive perceptions toward Physical Science they are likely to take the learning of Physical Science more seriously and the effective teaching is likely to take place.

4.7.4 The Grade 12 Physical Science teachers' teaching experience

During the interviews with the teachers and the advisory teacher, the advisory teacher agreed that the Grade 12 Physical Science teachers' experience as one of the factors affecting the use of effective teaching methods in teaching the subject in the Oshana Educational Region. Some teachers are used to only one type of teaching method, because they do not have the necessary experience to use other teaching methods. The advisory teacher remarked:

> *If the teacher is not experienced to use any other methods, if you change them* [teachers] *to* [use] *a different one, everything changes and they will not even have more energy and even their minds cannot think in that particular setting. In my region, there are teachers that are more teacher-centred and when you bring in any other things they will not perform well as they used to* [12 September 2014].

This finding seems to agree with the data collected through the teachers' questionnaire, in which the majority (8 out of 14) of the teachers had between 1 to 5 years of teaching

experience (see Table 5). It seems that most of the Grade 12 Physical Science teachers who participated in this study had not taught for many years, hence one could presume that the years of teaching experience of the Grade 12 Physical Science teachers could be a valid reason they were not using effective teaching methods.

4.7.5 Time allocated for Physical Science lessons

The other factor affecting the use of effective teaching methods agreed by the teachers in teaching the Grade 12 Physical Science Ordinary Level in the Oshana Educational Region was the limited time allocated on their timetables. According to the teachers' views expressed in the interviews, two teachers highlighted that the time allocated for Physical Science lessons was not enough. This was especially evident when teachers explained that, by using group work or undertake practical work, there would be many groups in the classroom due to a large number of learners. In a period of 40 minutes it might be difficult for the teacher to move to each group to guide and facilitate group activities. The following are some of the quotations from the interview:

Teacher SC remarked:

To move from one group to the next, time will not be enough in a 40 minutes period. The allocation of time for practicals is not enough, you cannot do it in the morning, because you will need two days to complete one lesson. It is time consuming when you are talking about covering the syllabus, hence the only time you can use is in the afternoon and it is not a convenient time for learners to do the activities, considering that there are many factors, for example, some learners will be sleeping, while others won't even bother to attend the lesson, [09 September 2014].

Teacher IS also remarked:

> *When you move from one group to another to check how the groups are doing, it requires time, therefore, to save time you have to limit the usage of such methods* [16 September 2014].

Teacher IK remarked: *Sometimes if the time is not enough I cannot do the practicals, I would rather shift it to the afternoon or Saturday* [11 September 2014].

The interview findings were consistent with the views of the participants (teachers, principals and the advisory teacher) in the questionnaires. Responses to statement 6.1 in Table 10 of the teachers' questionnaire shows that the majority (9 out of 14) of the teachers agreed that the time allocated for Grade 12 Physical Science Ordinary Level lessons on their timetables was not enough, while only five disagreed with the statement. In the same vein, statement 4.1, in Table 17 of the school principals' questionnaire, revealed that 6 out of 8 school principals agreed with the statement, "Time allocated for Physical Science Ordinary Level lessons on the timetable is not enough". Furthermore, statement 7.1, in Table 26 of the advisory teacher's questionnaire also agreed with the same statement, "Time allocated for Physical Science Ordinary Level lessons on the timetable is not enough".

4.7.6 The learners' poor backgrounds of Physical Science

During the interviews with the Grade 12 Physical Science teachers, 2 teachers said that the learners' poor background of Physical Science was among the factors affecting the use of perceived effective teaching methods in their teaching. They emphasized that some of the learners admitted to their secondary schools from the combined schools in the region had

little background knowledge of Physical Science. One can presume that learners were not exposed to different teaching methods, including group work, problem-based learning and practical work from their former school. As such, learners cannot work independently, without the teachers' assistance. The responses of the participants are quoted as below:

Teacher ELH remarked:

> *In our school, learners' backgrounds of Physical Science is not good enough, that's why we only use group work sometimes. When our learners come to us from other schools, they are not used to answering problematic questions; they are not exposed to problem solving activities. The experiences of the learners from the backgrounds or previous grades are a little bit low* [11 September 2014].

Teacher KF remarked that:

> *The learners' backgrounds of Physical Science are very poor, they need more assistance from the teacher* [09 September 2014].

These findings correspond with what was indicated by the teachers in the questionnaire. As presented in statement 4.3 in Table 8 of the teachers' questionnaire, 7 out of 14 the teachers agreed that most of their Grade 12 learners had poor Physical Science backgrounds from lower grades. In the same vein, statement 2.3, in Table 15 of the school principals' questionnaire, 5 out of 8 of the school principals agreed and statement 5.2, in Table 24 of the advisory teacher indicated agreed with the statement, "Most of the Grade 12 learners have poor Physical Science background from lower grades".

4.7.7 The learners' poor English proficiency

The teachers and the advisory teacher indicated in the questionnaires that they agreed with the statement: "Teachers' English proficiency is good enough to make learners understand the Grade 12 Physical Science Ordinary Level topics", as shown in Table 7 statement 3.3 of the teachers' questionnaire and in the advisory teacher's questionnaire, statement 2.3 in Table 22. However, in the interviews, the teachers agreed that poor English language proficiency among the learners as one of the factors affecting the use of the perceived effective teaching methods, particularly the problem-based learning method in their teaching process. They believed that their learners' English was not good enough for them to read and understand the Grade 12 Physical Science Ordinary Level questions and instructions. Below is one teacher's response:

Teacher SC remarked:

> *The English language barrier impedes learners' understanding of questions and instructions in Physical Science examinations. Therefore, I think that in some countries in which the mother tongue is used as medium of instruction, I think it is easier for the learners, because they will understand the questions better* [09 September 2014].

4.8 RESULTS FROM CLASSROOM OBSERVATIONS

Classroom observations were conducted with the aim of supporting or contradicting what the Grade 12 Physical Science teachers primarily claimed to have done when teaching Physical Science. Thus, 5 Physical Science teachers who participated in the interviews were also observed. The researcher observed the teachers teaching similar topics from the

Grade 12 Physical Science syllabus. The classroom sizes, the classroom arrangement and the availability of teaching and learning resources for Physical Science were also observed.

4.8.1 Classroom sizes

The classroom sizes observed ranged from 32 to 51 learners. Out of the 5 Grade 12 Physical Science teachers observed, 2 had classroom sizes of 32-41 and 3 had 42-51 Physical Science [NSSC] Ordinary Level learners in each classroom.

4.8.2 Classroom arrangement

Out of the 5 Grade 12 Physical Science teachers who observed, 4 had rows and columns sitting arrangements in their classrooms, while in 1 classroom, learners were sitting randomly (scattered). Four (4) classrooms were well organised and clean, while one was not well organised and; only one classroom had rich visual displays of the subject content on its noticeboard.

4.8.3 Grade 12 Physical Science teachers' time management

The results presented in Table 28 shows the arrival time for the Grade 12 Physical Science teachers who were observed.

Table 28: Physical Science teachers' time management

Teachers	Arrival time to lessons				
	Lesson 1	**Lesson 2**	**Lesson 3**	**Lesson 4**	**Lesson 5**
SC	3 minutes Early	4 minutes Early	6 minutes late	11 minutes late	9 minutes late
KF	6 minutes Early	2 minutes Early	7 minutes late	9 minutes late	17 minutes late
ELH	4 minutes Late	2 minutes Late	16 minutes late	12 minutes late	1 minute early
IK	4 minutes Early	7 minutes Late	18 minutes late	6 minutes late	15 minutes late
IS	2 minutes Early	12 minutes Late	3 minutes late	2 minutes early	18 minutes late

Table 28 shows that in lesson 1 at least 4 teachers arrived to their lessons with the time between 2-6 minutes early, while 1 teacher arrived 4 minutes late. Table 28 also shows that for lesson 2, two (2) teachers arrived early for their lessons with the time between 2-4 minutes, while other 3 teachers arrived between 2-12 minutes late. For lesson 3, all 5 teachers arrived late to their lessons with the time between 3-18 minutes.

Table 28 also revealed that for lesson 4, only 1 teacher arrived early to the lesson, while the other 4 arrived between 6-11 minutes late. Furthermore, Table 28 revealed that only 1 teacher arrived 1 minute early for lesson 5, while the other 4 teachers arrived for their lessons with the time between 9-18 minutes late. Interestingly, these results revealed that the Grade 12 Physical Science teachers who participated in this study went too late to their

lessons. This might also be a factor that may lead to insufficient time for teaching the Grade 12 Physical Science Ordinary Level.

4.8.4 Availability of teaching and learning resources

The lesson observations revealed that the availability of chairs and tables for learners in the Grade 12 Physical Science Ordinary Level classrooms was sufficient. It was also observed that the Grade 12 Physical Science Ordinary Level textbooks were adequate for learners. The observation results further revealed that in 5 out of the 8 secondary schools that participated in this study, not all learners had exercise books, while in the other 3 schools every learner had exercise books.

Furthermore, it was observed that the schools' laboratories did not have adequate equipment for the Grade 12 Physical Science practical work. It also became evident, in the classroom observations, that the Grade 12 Physical Science teachers who participated in this study 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.

4.9 DISCUSSION ON THE RESULTS

It is clear from the results of the questionnaire that the majority of Grade 12 Physical Science teachers who participated in this study had few years of teaching experience. Hill (2014) states that schools need teachers with significant teaching experience in order to deliver the subject knowledge successfully. This means that teachers with few years of teaching experience might be unable to explain all the concepts in Physical Science through applying different teaching methods in order to promote effective teaching.

The Grade 12 Physical Science teachers' responses to the questionnaire on the teacher-learner interactions in the classroom were positive. Teachers revealed that they promoted the learners' interaction in their classrooms by allowing them to ask questions during teaching, give them opportunities to evaluate their work as well as to teach each other. This is in line with Menekse et al. (2013), who state that the participation and the engagement of learners in the lessons is the main idea of effective teaching. However, school principals' and advisory teacher's responses in their questionnaires on the teacher-learner interactions revealed that teachers allowed learners to ask questions during teaching, but other activities were not considered in the classrooms by the teachers during Physical Science lessons. Teachers did not consider giving learners the opportunity to evaluate their own work by marking themselves or allowing them to teach one another in their classes.

When followed up in the interviews, the teachers contradicted themselves by revealing that time allocated in their timetable to teach Physical Science was not enough to engage learners in different learning activities during the lessons. Furthermore, the classroom observations also confirmed that the teachers who participated in this study did not involve learners in their lessons, because in most of the lessons observed the Physical Science teachers did not manage the time for lesson presentation and learners participations effectively. The classroom observations further revealed that teachers went too late to their lessons (see sub topic 4.8.3, Table 28). This could mean that the Grade 12 Physical Science teachers who participated in this study did not involve their learners in different learning activities in order to promote effective teaching in their lessons due to poor time management.

It is also clear from the results of both the school principals' and advisory teacher's questionnaire that teachers did not give class activities after every lesson or mark all learners' work as they claimed. When followed up in the classroom observations the researcher also found that the Physical Science teachers rarely gave class activities or marked their learners' homework books consistently. This simply means that if teachers did not assess their learners more frequently they might not find out what learners did not understand and as a result effective teaching might not take place.

The participants' responses in the questionnaire on their views on the learners' attitudes toward learning Physical Science were negative. Swan and Fisch (2010) stated that attitudes usually lead to positive or negative behaviour. The attitudes of learners toward learning are important in determining their level of performance. In this study a total number of 6 teachers, 5 school principals and the advisory teacher indicated that many learners in their schools are not willing to learn Physical Science (see Tables 8, 15 and 24). In the same vein, the majority (10 out of 14) of teachers also agreed that most of their Grade 12 learners did not take Physical Science Ordinary Level work seriously. Edomwonyi-Otu and Abraham (2011) observed that, the teaching of science can be successful in the classroom when learners are willing to learn. This simply means that if learners are not willing to learn certain subject content, learning will not be effective. When followed up in the interviews, the answers teachers gave, regarding learners' attitudes toward learning Physical Science revealed that learners' willingness to take the Grade 12 Physical Science seriously was affected by the negative attitudes they had towards the subject (see sub topic 4.7.3).

Furthermore, 7 Grade 12 Physical Science teachers, 6 school principals and the advisory teacher agreed with the statement that most of the Grade 12 learners had poor Physical

Science backgrounds from lower grades (see Tables 8, 18 and 24). Clarke (2005) argues that as learners proceed through grades, vocabularies and concepts become increasingly abstract and many learners fall further behind, because their level of mastery is rudimentary to allow for fluent learning. This might indicate the reason learners from poor Physical Science backgrounds perform poorly as they proceed with their education.

When the Grade 12 Physical Science teachers were followed up in the interviews, the teachers answered that learners who were admitted to their schools from other schools within the region had little background knowledge of Physical Science. They said that learners cannot cope with different teaching methods and as a result they were not able to work independently, without the teachers' assistance (see sub-topic 4.7.6). Jacobs, Vakalisa and Gawe (2011) stated that it is important for the teachers to have good knowledge on the content they are teaching in order to help learners to understand the subject. It can be assumed that teachers with good subject knowledge know how to teach the subject content with understanding, which is likely to promote effective teaching rather than to teach for rote learning.

Garcia (2003) states that, teachers' poor background of science knowledge can cause them not to be able to deliver the subject content with the right teaching approaches, and possibly this could cause learners not to understand what they are being taught. This simply means that if teachers who lay the Physical Science foundation for the learners (lower grades teachers) have poor subject knowledge it would also promote the ineffective teaching and learning as learners progress to the next grades.

The results from the participants' questionnaire, interviews and classroom observations on the availability of resources were negative. It would appear that the schools involved in this study in the Oshana Educational Region did not have enough resources in their science laboratories. Kandjeo-Marenga (2011) states that, most Namibian secondary schools have inadequate resources particularly in their science laboratories for teaching. Half (7 out of 14) of the teachers, 5 out of 8 school principals and the advisory teacher indicated that their secondary schools' laboratories did not have all the equipment and resources (see Tables 9, 16 and 25). When followed up in the interviews, the answers provided by the participants on the availability of laboratory equipment and resources revealed that schools did not have adequate equipment or resources to promote effective teaching in their teaching process (see sub-topic 4.7.2).

These findings were consistent with the classroom observations conducted by the researcher, which revealed that the laboratories for secondary schools that participated in this study did not have adequate facilities for practical work (see sub-topic 4.8.4). Synder and Viogts' (1998) argue that the unavailability of teaching and learning materials, such as apparatus and chemicals, have negative effects on effective teaching, which suggests that effective teaching is constrained in the schools where there are inadequate laboratory facilities. Likoko et al. (2013) also report that the availability of teaching-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. This means that if the schools' laboratories did not have enough equipment and resources it might be difficult for teachers, particularly for Physical Science, to achieve effective teaching in their classrooms.

The results from the participants' questionnaire on their views on the teaching of Grade 12 Physical Science curriculum revealed that the majority (9 out of 14) of teachers, 6 out of 8 school principals and the advisory teacher agreed that time allocated for Physical Science lessons on the timetable was not enough. When followed up in the interviews, the answers teachers gave were the same to what they had indicated in their questionnaires on the insufficient time (see sub topic 4.7.5). Although the participants revealed that time given to Physical Science for teaching was not enough to be able to employ the teaching methods which required the involvement of learners, the teachers came to classes late. The classroom observations results revealed that the teachers who participated in this study had poor time management (see Table 28). It was found that some teachers came to their lessons up to18 minutes late. These minutes wasted by the teachers could be used more effectively for more class activities to enhance effective teaching.

The views on the overcrowded classrooms provided by the participants in the questionnaires and expressed by the teachers in the interviews as well as classroom observations results were in line with the views of Folashade and Aiknbobola (2009). Folashade and Aiknbobola (2009) revealed that large class size have a negative effect on the learners' performance in science, because teachers cannot engage and assist all the learners during the teaching process. This means that if schools have overcrowded classrooms it is difficult for teachers to assess learners during lessons and to utilize the science laboratory effectively. It might also be difficult for teachers to employ different teaching methods that promote effective teaching. Furthermore, Kandjeo-Marenga (2011) points out that, in Namibian secondary schools, teachers find it difficult to teach science practical work because some schools have small laboratories which cannot accommodate large numbers of learners. This means that the overcrowded classrooms might prevent the

Grade 12 Physical Science teachers from conducting practical work and in turn negatively impact on effective teaching.

Moreover, although the majority (11 out of 13) of the Physical Science teachers and the advisory teacher indicated that teachers' English was good enough to make learners understand Physical Science content (see Tables 7 and 22), it seems that their learners had poor English proficiency. When followed up in the interviews, the answers teachers gave emphasized that English language was the main barrier to learners' understanding of the instructions and questions in Physical Science examinations (see sub-topic 4.7.7). 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. 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. This means that if learners have sub-standard English they could be disadvantaged when it comes to taking examinations in English. One can speculate that, 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 examinations.

4.10 RESEARCH OBJECTIVE TWO: TO FIND OUT TO WHAT EXTENT GRADE 12 PHYSICAL SCIENCE TEACHERS USE EFFECTIVE TEACHING METHODS IN TEACHING PHYSICAL SCIENCE?

This section presents and discusses the extent to which the Grade 12 Physical Science teachers use the perceived effective teaching methods in their teaching of Physical Science NSSC Ordinary Level. In order to collect information that enabled the researcher to provide answers to the abovementioned research objective. The researcher made use of the

questionnaires (see Appendixes 6 and 8), interviews (see Appendixes 9-10) and observations (see Appendix 11).

Results from the questionnaires are presented in section 4.10.1, results from the interviews are presented in section 4.10.2 and the classroom observations are in section 4.10.3.

4.10.1 Results from the Grade 12 Physical Science Teachers' and the advisory teacher's questionnaires

4.10.1.1 Teachers' views on the teaching methods used

The questionnaire had 5 possible teaching methods the teachers could use in their teaching of Grade 12 Physical Science Ordinary Level. The teachers were asked to give their views by choosing from *Agree, Disagree* or *Not sure* to the 5 listed teaching methods in Table 29 (below).

Table 29: **Teaching methods used by teachers**

	Responses		
Statements	**Disagree**	**Not sure**	**Agree**
1.1 I use lecture method in my teaching often	10	2	1
1.2 I use problem-based learning method often	2	1	10
1.3 I use group work method often	2	1	10
1.4 I use discussion method often	0	1	13
1.5 I use practical work method often.	0	2	12

Table 29 shows that, the majority (10 out of 13) of Grade 12 Physical Science teachers agreed that they used group work and problem-based learning methods in their teaching often and one teacher was not sure. Ten teachers disagreed that they used lecture method often, 2 teachers were not sure and 1 teacher agreed that he used the lecture method in his teaching. Furthermore, Table 29 shows that the majority (12 out of 14) of teachers agreed that they used practical work method often in their teaching of Grade 12 Physical Science, while 2 teachers were not sure.

4.10.1.2 The advisory teacher's views on the teaching methods used by teachers

The questionnaire had five possible teaching methods the teachers could use in their teaching of Grade 12 Physical Science Ordinary Level. The advisory teacher was asked to give his views by choosing from *Agree, Disagree* or *Not sure* to the five listed teaching methods in Table 30 (below).

Table 30: **Advisory teacher's views on teaching methods used by the Grade 12 Physical Science teachers**

	Responses		
Statements	**Disagree**	**Not sure**	**Agree**
1.1 Teachers use lecture method in my teaching often	0	0	1
1.2 Teachers use problem-based learning method often	0	1	0
1.3 Teachers use group work method often	1	0	0
1.4 Teachers use discussion method often	0	1	0
1.5 Teachers use practical work method often	1	0	0

Table 30 shows that the advisory teacher agreed that the Grade 12 Physical Science teachers used lecture methods in their teaching often. Table 30 also shows that the advisory teacher was not sure whether teachers were using problem-based learning method often in their teaching. However, the advisory teacher disagreed when presented with the statement "Teachers used group work teaching method often". In addition, Table 30 shows that the advisory teacher also disagreed that teachers used practical work method often in their teaching process.

These results contradict what the Grade 12 Physical Science teachers indicated in the questionnaire. Although the teachers claimed that they used teaching methods such as group work and practical work in their teaching process, the advisory teacher disagreed with them and indicated that teachers were using the lecture method in their teaching.

4.10.2 Results from Grade 12 Physical Science teachers' and the advisory teacher's interviews

In order to have a deeper understanding of the participants' views from the questionnaires, interviews were conducted on a one-on-one basis. A total of 5 teachers and 1 advisory teacher were interviewed in order to provide in-depth information which would further explain the results obtained from the questionnaires.

This section presents results on teachers' and the advisory teacher's views on the extent to which the Grade 12 Physical Science teachers used the perceived effective teaching methods such as group work, problem-based learning and practical work in their teaching process.

4.10.2.1 Group work

During the interviews with the teachers, 2 Grade 12 Physical Science teachers reported that they used the group work teaching method more often because it allows learners to learn from each other through interaction, while the other 2 teachers reported that they used it sometimes, because it took more time to employ it successfully and 1 teacher was not sure. In addition, the advisory teacher stated that it was very rare for teachers to use the group work method due to overcrowded classrooms. Their responses are provided below:

> Teacher SC remarked**:** *I used it sometimes; basically here I will be honest with you, having a big school like this one with a lot of learners not always easy to arrange learners in groups, because we have close to 50 learners in a classroom.* [09 September 2014].

Teacher KF remarked**:** *I used it often; because learners need background knowledge about a particular topic, therefore, I used the whole class teaching method.* [09 September 2014].

Teacher IK remarked**:** *I used it often; so that learners will learn more when they are sharing information, rather than just the teacher explaining while they are listening* [11 September 2014].

Teacher ELH remarked**:** *I used it sometimes; because we have two different types of learners in our classrooms (low and high) and the teacher has to arrange groups which comprise of high and low learners in order to learn from each other, but it is time consuming* [11 September 2014].

Teacher IS remarked**:** *I used it sometimes; because I prefer the lecture method sometimes, especially when time is insufficient and I also used other methods depending on the types of learners I have* [16 September 2014].

The advisory teacher, nonetheless, remarked: *Teachers are not using group work, one of the most hinder factor avoiding teachers from using the group work method is certainly overcrowding of classes. Classes are overcrowded if you are dealing with a class of fifty learners is actually not possible to apply this teaching method* [12 September 2014].

From these findings it is difficult to determine whether teachers were using group work more often in their teaching since only 2 teachers claimed to use it, while 3 other teachers including the advisory teacher disagreed. However, by looking at the views expressed by the teachers and the advisory teacher during the interview claiming that it was a challenge to employ such teaching method, because classes were overcrowded at their schools in which they taught. Therefore, one could speculate that the teachers only claimed to use group work method in their teaching in order to give a good impression to the researcher, or maybe they had a different understanding of what "group work" meant.

4.10.2.2 Problem-based learning

In the interviews with the teachers, 3 Grade 12 Physical Science teachers reported that they used the problem-based learning method more often, because learners tended to learn better through challenging questions given to them and it also allows learners to think independently. However, 2 teachers reported that they seldom used it, because of the slow learners in their classrooms and that it would take time for teachers to compile the teaching and learning resources for the two types of learners (fast and slow) study. Their responses are given here:

> Teacher SC remarked: *I used it sometimes; because of the slow learners we accommodate in our classrooms, not every learner has the ability to solve problems, therefore if you use it often, it will destruct some learners who want to learn, especially the slow learners and they will find the subject slightly harder* [09 September 2014].

Teacher KF remarked: *I used it often; the problem may be that learners they might not have a better knowledge or their background are poor in the topic they are learning, therefore, I prefer other methods.* [09 September 2014].

Teacher IK remarked**:** *I used it often, to give learners freedom to think on their own and also to relate their learning to their daily activities* [11 September 2014].

Teacher ELH remarked**:** *I used it sometimes; it will train learners on how to answer different questions, but it takes time for the teacher to organise such instruments* [11 September 2014].

Teacher IS remarked**:** *I used it often, because I believe Physical Science is a problem based subject, hence I always give learners problems to solve to allow them to experience how the examination questions are structured* [16 September 2014].

These findings imply that teachers who participated in this study were using problem-based learning method in their teaching-learning process.

4.10.2.3 Practical work

During the interviews, 2 Grade 12 Physical Science teachers reported that they used the practical work teaching method often, because it enabled the learners to easily recall what

they were taught, while 3 teachers reported using it seldom (sometimes), because of the lack of materials in schools. The responses were as follows:

> Teacher SC remarked**:** *I used it often; the first problem which we have is lack of materials in our laboratory, they are poorly equipped with materials for practical work. For example, you are to conduct a lesson on measurement of temperature and you only have two Thermometers for forty seven learners* [09 September 2014].

> Teacher KF remarked: *I used it often; because we do not have specific classroom for Physical Science and we do not have materials such as Cathode Ray Oscilloscope, Van Der Gaarf Generator as a results we are forced to teach using their pictures* [09 September 2014].

> Teacher IK remarked: *I used it more often; because of the different learners with different capabilities some will learn more or understand through observation, while others through explanations* [11 September 2014].

> Teacher ELH remarked**:** *I used it sometimes; because it allow learners to make their own conclusion by seeing things with their own eyes* [11 September 2014].

> Teacher IS remarked: *I used it sometimes, because we do not have enough materials and chemicals for practical. Therefore, I prefer using theory*

explanations to learners in the absence of laboratory materials [16 September 2014].

The advisory teacher, nonetheless, remarked: *The lack of laboratories equipment demoralized teachers from using practical method in their teaching, you come at some schools' laboratories there is nothing, but only some cylinders and few flasks.* [12 September 2014].

Despite the participants having indicated earlier in their questionnaire responses that lack of laboratories resources was one of the challenges that prohibited teachers from undertaking practical work with their learners, in the interviews, 3 teachers said that they were using practical work in their teaching. However, 2 teachers and the advisory teacher were in opposition by providing the same reason of lack of laboratory resources at schools.

4.10.3 Results from classroom observations

Classroom observations were conducted with the aim of verifying the data as supporting or contradicting what teachers initially maintained to have done about the usage of effective teaching methods in teaching Physical Science. Thus, the 5 Grade 12 Physical Science teachers who participated in the interviews were also selected to participate in classroom observations, teaching similar topics from the Physical Science syllabus. The teachers were observed in 5 lessons each, to give a total of 25 lessons.

This section below discusses the summary of the results in Table 31 in order to address the second research objective of this study. The descriptions in Table 31 illustrate the extent to

which different teaching methods such as lecture method, group work, problem-based learning and practical work have been used during classroom observations. The second research objective was "*To find out to what extent Grade 12 Physical Science teachers use effective teaching methods in teaching Physical Science Ordinary Level in the Oshana Educational Region".* In order to answer this research objective, a summary of the frequency counts of how often teachers used different teaching methods in their lessons is given in Table 31 below.

Table 31: Summary of the teaching methods used by 5 teachers in 5 lessons observed each

Lessons (L)	**L_1**	**L_2**	**L_3**	**L_4**	**L_5**
Lecture method	√ √ √ x √	√ √ √ √ √	√ √ x x √	√ √ x x √	√ √ √ x √
Group work	x x √ √ x	x x x x x	x x √ √ x	x x x √ x	x x x √ x
Practical work	x x √ √ x	x x x x x	x x √ x √	√ x x x x	x x x √ x
Problem-based learning	√ x x x √	x x x x x	x x √ √ x	x √ √ x x	√ x x x x

Keys: √ *Teaching method used in lesson*; **x** *Teaching method not used in lesson*

From the table above, one can see that the lecture method displays a reasonable amount of counts across the five lessons observed compared to the group work, practical work and problem-based learning. From the lesson observations, it became evident that the Grade 12 Physical Science teachers did not employ often the teaching methods such as group work, practical work and problem-based learning methods which could allow learners to learn from one another in their teaching.

Based on the classroom observations results shown in the table above, one could, speculate that the extent to which 5 Grade 12 Physical Science teachers who participated in this

study, their usage of the teaching methods such as group work, practical work, and problem-based learning methods in their teaching was minimal. This might be attributed to various factors such as lack of resources and overcrowded classrooms which were hindering the implementation of these teaching methods in the schools that participated in this study.

4.10.4 Discussion of the results

Although the majority of teachers indicated in the questionnaire and in the interviews that they used the following teaching methods, i.e., group work, problem-based learning and practical work more often in their teaching process, when followed up in classroom observations this was not the case. It appears that the Grade 12 Physical Science teachers who participated in this study preferred using the lecture method and question and answer method in their teaching process. This agrees with Kapenda's (2008) claim that some teachers in Namibian 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.

Ylanne et al. (2006) stated that teachers who teach in the hard disciplines, such as Science, Engineering and Medicine, are likely to employ teacher-centred approach (lecture method) in their teaching process. On the other hand, Lei (2002) states that the teaching of Physical Science requires the use of teaching methods that encourage learners to actively participate in the teaching and learning process for effective teaching to take place. This was not the case with the Grade 12 Physical Science teachers who participated in this study, as they preferred using traditional methods.

When followed up with classroom observations, it became evident that the Grade 12 Physical Science teachers in the Oshana Educational Region who participated in this study rarely involved learners in lessons by using the lecture method and they rarely allowed learners to do practical work in the laboratories. Al Maghraby and Alshami (2013) state that science teachers need to use teaching methods which are more flexible, creative and more learner-centred, in order to accommodate different learning styles of learners in their classrooms for effective teaching to take place. One might speculate that the usage of the lecture method (traditional method) by teachers who participated in this study in their teaching might cause ineffective teaching in the Oshana Educational Region.

Abraham and Miller (2008) noted that practical work is meaningful in the teaching-learning process as it tends to boost the learners' interest of learning. This means that if teachers do not allow learners to do practical work it might decrease their interest in Physical Science and could also likely cause ineffective teaching to take place.

Muijs and Reynolds (2011) maintained that group work allows learners to exchange their knowledge on the subject through interaction with their peers. Use of this method might create a good platform for learners to learn from their peers. While Folashade and Akinbobola (2009) claim that problem-based learning allows the learners to acquire the subject knowledge on their own, if teachers employ problem-based learning method in their teaching process learners might understand the subject content much better and enhance performance in Physical Science. However, it can be suggested that if the Grade 12 Physical Science teachers could start using group work, practical work and problem-based learning methods more often in their teaching process, the effective teaching which

may lead to good performance of learners in the Grade 12 Physical Science might occur in the Oshana Educational Region.

4.11 RESEARCH OBJECTIVE THREE: TO SUGGEST STRATEGIES THAT CAN BE IMPLEMENTED TO IMPROVE THE TEACHING OF GRADE 12 PHYSICAL SCIENCE ORDINARY LEVEL IN THE OSHANA REGION.

This section presents and discusses the Grade 12 Physical Science teachers' suggestions about the possible strategies that could be implemented in order to improve the teaching of Grade 12 Physical Science Ordinary Level in the Oshana Educational Region. In order to collect information that enabled the researcher to provide answers to the above research objective the researcher made use of an interview schedule (see Appendix 9). The findings that emerged from the interviews with the teachers are presented under the following headings: remedial classes; the use of class activities instead of homework; specific Physical Science classroom and teachers' exchange programme.

4.11.1 Remedial classes

In the interviews with the teachers, all the five Grade 12 Physical Science teachers who were interviewed highlighted the importance of remedial classes and how they could promote effective teaching of Physical Science Ordinary Level. These were their responses:

> Teacher SC remarked: *Remedial is very important; because it gives you time to attend to those pupils who are slow learners. Slow learners need time which is different, so to say, very different from the rest of the classes and remedial*

teaching will play a very important role in that aspect, because you don't need to see everybody, but only the selected target learners [09 September 2014].

Teacher KF remarked: *Learners need the remedial classes, because some learners are below average and some are above average, those that are above average, we will give them extra work. I need to set different activities for these learners, that is why we need remedial to give extra work* [09 September 2014].

Teacher IK remarked: *I think it is very crucial, because based on the capabilities of the learners that we have, they really need more time, need more attention, because you find that the majority only have Ds, Es, and Fs as symbols from their Grade10 results in Physical Science* [11 September 2014].

Teacher ELH remarked: *I will need more time with my learners to be able to give them more problem to solve in groups. The remedial classes will allow me to use different teaching methods, because I have more time to help learners that have poor background knowledge of Physical Science* [11 September 2014].

Teacher IS remarked: *That's to allow for enough time to finish the syllabus and also to help learners, especially the slow learners to catch up* [16 September 2014].

4.11.2 The use of class activities instead of homework

Also, in the interviews with the teachers, 2 Grade 12 Physical Science teachers identified the use of class activity instead of homework as one strategy that could promote effective teaching of Physical Science Ordinary Level. Their responses were:

> Teacher SC remarked: *It is very important to use class activities rather than homework. When you use a lot of homework, learners tend to cheat, I do not see the difference between learners cheating at home and learners cheating in class. I would emphasis more class activities which give you an opportunity to assess learners based on their capabilities* [09 September 2014].

> Teacher IK remarked: *Sometimes if you give learners a question or assignment as homework, learners tend to ask their siblings to do it on their behalf* [11 September 2014].

4.11.3 Classrooms for Physical Science only

With regard to the classrooms for Physical Science only, the teachers stated that if the school could have classes specifically made for Physical Science only it might help learners to learn, even from the posters on the noticeboard, because teachers would be able to display as many subject content posters in the classrooms as possible. The following is a quotation of one of the teachers' responses:

Teacher KF remarked: *The schools need to have a specific Physical Science classroom which is associated with posters to allow the learners to learn by seeing* [09 September 2014].

4.11.4 Teacher exchange programme

During the interviews, the Grade 12 Physical Science teachers agreed that the teacher exchange programme as another means that might promote the effective teaching of Physical Science Ordinary Level in schools. This programme would create a good platform for the teachers to learn from one another. These were their responses:

Teacher IK remarked: *The schools should come up with teacher exchange programmes to help each other* [11 September 2014].

Teacher IS remarked: In the teacher exchange programme, *the non-performing Grade Twelve Physical Science teachers from one school in the region need to observe other teachers from the performing schools on how they approach a certain topic* [16 September 2014].

4.11.5 Discussion of the results

It is clear from the results of all the Grade 12 Physical Science teachers', school principals' and advisory teacher's questionnaires that the majority of the participants indicated that remedial classes for Physical Science were not made available on the teachers' timetable. When followed up in the interviews, the answers that the teachers gave regarding possible

strategies to improve the teaching of Grade 12 Physical Science in the Oshana Educational Region, teachers mentioned that remedial classes gave sufficient time for them to attend to those pupils who were slow learners (see sub-topic 4.7.5). This is an indication that teachers felt that remedial classes might improve their teaching process. They believed that remedial classes might provide enough time for them in order to assist all learners (slow and fast) to understand the subject content. Furthermore, teachers also believed that remedial classes might allow them to give extra work to their learners as well as to finish their syllabus on time and also to do revisions on time.

However, the results from the questionnaires of teachers and the school principals indicated that the Grade 12 Physical Science teachers did not have classrooms made specifically for Physical Science. When followed up in the interviews, the teachers mentioned that if schools had classes specifically made for Physical Science it would help learners to learn even from the posters of science on the noticeboards, because teachers would be able to display as many subject content posters in the classrooms as possible (see sub-topic 4.11.3). The participants further revealed that this might make it possible for teachers to be able to organise the classroom sitting arrangement in a manner that could allow learners to learn through interactions with their peers.

Moreover, the results from the interviews, teachers revealed that the use of class activity instead of homework could promote effective teaching, because learners tended to use their own capabilities which promoted high thinking skills in learners (see sub-topic 4.11.2). The Ministry of Education (2010) stated that teachers were expected to use problem-solving activities in order to promote high thinking skills among the learners. Teachers

who participated in this study believed that problem-solving activities might be significant if they allowed learners to solve them in the classroom, rather than making problem-solving activities as homework. In addition, the teachers believed that when learners were given homework, it hindered their learning process because learners do not understand the competences that were asked in the homework, but instead the work was done for them by their parents or peers.

The interviews also revealed that, the teacher exchange programme could promote the effective teaching of Physical Science, because it would provide a good platform for the teachers in the Oshana Educational Region to learn from one another (see sub-topic 4.11.4). Teachers who participated in this study were of the opinion that the Grade 12 Physical Science teachers from the good performing schools in the region needed to be identified in order to help their fellow teachers from the poor performing schools by teaching some topics while others were observing in order to acquire the skills needed to effectively approach such topics. This means that if the Grade 12 Physical Science teachers in the Oshana Educational Region implemented teacher exchange programme effective teaching might take place in the region.

4.12 SUMMARY

This chapter presented and discussed the results from the questionnaires, interviews and classroom observations. A number of pertinent issues emerged from the results. For example, teachers were very positive in their questionnaires' responses that they used different teaching methods that promoted interactions among learners in the classrooms in order to enhance effective teaching of the Grade 12 Physical Science. But this became

even clearer from the classroom observations' results which revealed that most of the teachers preferred the lecture method in their teaching process most of the times.

The results from the questionnaires, interviews and classroom observations, also made it evident that the major factors prohibiting the Grade 12 Physical Science teachers from using the perceived effective teaching methods in their teaching were overcrowded classrooms; time allocated for Physical Science lessons; the lack of resources; Grade 12 Physical Science Ordinary Level learners' attitudes toward learning Physical Science; learners' poor background of Physical Science; learners' poor English proficiency; and the use of other teaching methods by the Grade 12 Physical Science teachers.

Finally, the interviews with teachers suggested possible strategies that might be implemented to improve the teaching of the Grade 12 Physical Science as: remedial programme; the use of class activities instead of homework; the Grade 12 Physical Science teachers better rendering their own classroom solely for Physical Science as well as the introduction of a teacher exchange programme.

The next chapter provides a summary, draws conclusions and makes recommendations with regards to the research objectives of this study.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

In this chapter, the summary of the study is presented, the conclusions are drawn on the basis of the findings and then recommendations are made.

5.2 SUMMARY

This study sought to provide achieve to the following objectives:

1. To determine the views of teachers, school principals and the advisory teacher on the factors affecting the effective teaching of Grade 12 Physical Science in the Oshana Educational Region.
2. To find out to what extent the Grade 12 Physical Science teachers use effective teaching methods in teaching Physical Science.
3. To suggest strategies that can be implemented to improve the teaching of Grade 12 Physical Science in the Oshana Educational Region.

The population of this study consisted of all 14 secondary schools in the Oshana Educational Region, 28 Grade 12 Physical Science Ordinary level teachers, 14 school principals and one advisory teacher for Physical Science Ordinary Level in the Oshana Educational Region. Purposive sampling technique was employed to select 8 out of 14 secondary schools that performed poorly in the Grade 12 Physical Science Ordinary Level in the National Examinations of 2011, 2012 and 2013. However, the sample of this study consisted of a total of 25 participants who were obtained as follows: 8 school principals

from the 8 selected secondary schools and 1 advisory teacher, and 16 Grade 12 Physical Science teachers who were chosen purposively from the eight secondary schools (each school had at least two Grade 12 Physical Science teachers).

In order to seek responses to the stated objectives, this study adopted a mixed methods research approach and employed both quantitative and qualitative methods. The quantitative data was collected using closed-ended questions through questionnaires, followed by the collection of qualitative data through interviews and lesson observations (see Appendices 6-11). The quantitative data generated from the closed-ended questions was analysed using descriptive statistics (frequency tables) to identify general characteristics of the participants' views on factors affecting the effective teaching of Physical Science Ordinary Level in the Oshana Educational Region, Namibia. The analysed results from the questionnaires were then used to formulate interview questions that helped to provide more data to the study, as well as to provide suggestions on the strategies that could be implemented to improve the teaching of Physical Science Ordinary Level in the Oshana Educational Region. Lesson observations were used to supplement findings from the questionnaire and interview phases. The qualitative data from the interviews was analysed using the content analysis technique and organised into categories that emerged from this process.

The following were some of the major findings of this study:

This study found that, the majority of the participants believed that learners' poor background in Physical Science was one of the factors affecting the effective teaching of the Grade 12 Physical Science Ordinary Level in the Oshana Educational Region. The

study also revealed that most teachers were of the opinion that lack of resources was one of the factors that hindered the Grade 12 Physical Science teachers from using the effective teaching methods in their teaching. For example, the teachers identified lack of laboratory resources, such as chemicals and apparatus and complained of laboratory rooms being too small to accommodate the large number of learners. Furthermore, the teachers complained about overcrowded classrooms which made the use of group work difficult and identified this as another major factor hindering effective teaching of Physical Science to take place.

In addition, the majority of teachers indicated that learners' attitudes toward learning the Grade 12 Physical Science Ordinary Level were among the factors affecting the effective teaching which made teaching and learning difficult. Most learners were not willing to participate or to fulfil the tasks assigned to them.

Lastly, the study revealed that although teachers indicated that they used the group work, problem-based learning, and practical work methods often in their teaching of Physical Science Ordinary Level, the results from classroom observations indicated that most Grade 12 Physical Science teachers used traditional methods. Traditional methods were used most of the time in their teaching, which did not allow learners to interact much with the teachers or among the learners themselves in the lessons.

5.3 CONCLUSIONS

Based on the findings of this study it can be concluded that the Grade 12 Physical Science teachers who participated in this study used the lecture method more often than other methods of teaching in their classrooms. They rarely used the perceived effective teaching methods, such as group work, problem-based learning or practical work methods in their

teaching. The findings also indicated that the teachers rarely allowed learners to participate in the selection and organisation of the learning activities.

It can also be concluded that the Grade 12 Physical Science Ordinary Level teachers preferred teaching methods that gave them the opportunity to have control over their learners during the teaching-learning process due to overcrowded classrooms.

Finally, it can be concluded that most of the participants believed that there are numerous factors affecting the effective teaching of the Grade 12 Physical Science in the participating secondary schools in the Oshana Educational Region. These include overcrowded classrooms, lack of resources, learners' attitudes toward learning, poor time management by the teachers, learners' poor background in Physical Science, and the perceived learners' poor English language proficiency.

5.4 RECOMMENDATIONS

In light of the findings of this study, the following recommendations are made, in order to promote the effective teaching of Grade 12 Physical Science Ordinary Level in the Oshana Educational Region.

5.4.1 Grade 12 Physical Science teachers

1. It is recommended that the teachers consider using the effective teaching methods such as group work, problem-based learning, and practical methods in their teaching of the Grade 12 Physical Science Ordinary Level more often.

2. It is further recommended that the teachers improvise for the unavailable laboratory materials by using alternative materials (such as empty containers and tins) from the

environment, as well as recyclable materials to be used during practical work in their teaching.

5.4.2 The school principals

1. It is recommended that school principals explore ways to assess the Grade 12 Physical Science teachers in their lessons; to make sure that teachers are using effective teaching methods in teaching Grade 12 Physical Science Ordinary Level.

2. It is also recommended that the school principals and Heads of Departments frequently monitor the Grade 12 Physical Science teachers to ensure that they (teachers) are attending to lessons on time in order to prevent them from going to classes late.

3. In addition, it is recommended that school principals encourage the use of teacher exchange programmes, in which the Grade 12 Physical Science teachers from good performing schools would be allowed to teach some lessons at low performing schools while other teachers observed their lessons.

4. Lastly, it is recommended that school principals and Heads of Departments frequently monitor teachers to ensure that they (teachers) give more class activities and homework and that all assessment activities are marked.

5.4.3 The Grade 12 Physical Science advisory teacher

It is recommended that the advisory teacher visit secondary schools more regularly to ensure that all the Grade 12 Physical Science teachers in the region are using effective teaching methods in their teaching of the Grade 12 Physical Science Ordinary Level lessons.

5.4.4 Ministry of Education

It is recommended that the Ministry of Education, in conjunction with other education stakeholders, introduce a policy of the English proficiency programme in the secondary schools for the Physical Science learners in order to improve their understanding of the used English as medium of instruction.

5.5 FURTHER RESEARCH

This study was conducted in eight selected secondary schools in the Oshana Educational Region. The findings may not be generalisable to other schools and educational regions in Namibia. Therefore, there is a need to conduct similar studies in other educational regions in Namibia. The same study could also be conducted in the primary and junior secondary schools in order to promote the effective teaching of Physical Science from early grades in Namibia.

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.*

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.

Amutenya, M. N. (2002). *Active Learner Participation: A study of the BETD INSERT teachers' classroom practices in the Ondangwa east and west regions.* Thesis submitted in the partial fulfilment of the award of a master degree. Windhoek: University of Namibia.

Awe, G. A. (2007). *An Investigation into the knowledge and practices of learner-centred methods of teaching by Physical Science teachers in the Omusati Education Region.* Thesis submitted in partial fulfilment of the award of a master degree. Windhoek: University of Namibia.

Aziz, Z. S. & Yasin, M. R., (2013). The quality of teaching and learning towards the statifaction among the University students. *Asian Social Science,* 9(12), 252-260.

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

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

Clarke, P.(Ed.). (2005). *Improving schools in difficulty.* London: Continuum.

Cohen, L. Manion, L. & Marrison, K. (2011). *Research Methods in Education* (7th ed.). New York: Routledge Taylor and Francis Group.

Creswell, J. W. (2009).*Research Design. Qualitaitive, Quantitative, and Mixed Methods Approaches.* California: Sage.

Creswell, J. W. (2014). *Research Design. Qualitaitive, Quantitative, and Mixed Methods Approaches.* (4th ed.). California: Sage.

De Vos, A., Strydom, H., Fouche, C.D., & Delport, C.S.L. (2005). *Research at grass roots for the social sciences and human services professions* (3th ed.). Pretoria: Van Schaick.

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

Dogan, N., Cakiroglu, J., Bilican, K., & Cavus, S. (2013). What NOS teaching practices tell us: A case of two science teachers. *Journal of Baltic Science Education*. 12(4), 424-439.

Dunne, R. & Wragg, T. (1997). *Effective Teaching.* London: Routledge.

Edomwonyi-Otu, L. & Abraham, A. V. A. A. (2011). The challenge of effective teaching of chemistry: A case study. *Leonardo Electronic Journal of Practices and Technologies*, *10*(18), 1-8.

Folashade, A. & Akinbobola, A. O. (2009). Constructivist problem based learning technique and the academic achievement of Physics students with low ability level in Nigerian Secondary Schools. *Eurasian J. Phys. Chem.Educ,* 1(1), 45-51.

Gall, M. D., Gall, J. P.& Borg, W.R. (2007).*Educational research- An introduction (8th ed.)*. Boston: Pearson Education.

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.

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

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

Jacobs, M., Vakalisa, N. C. G. & Gawe, N. (2004). *Teaching-Learning Dynamics.* Cape Town: Heinemann.

Jacobs, M., Vakalisa, N. C. G. & Gawe, N. (2011). *Teaching-Learning Dynamics (4th ed.).* Cape Town: Heinemann.

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

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

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.

Khoboli, B. & O'Toole, J.M. (2011). Learner-centred science in Lesotho: Adapting the ideal to adjust classroom practice. *African Journal of Research in MST Education*, 15(1), 80-91.

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: Bevan Group.

Kriek, J. & Grayson, D. (2009). A holistic professional development model for South African Physical Science teachers. *South African Journal of Education*, 29, 185-203.

Kyriacou, C. (2001). *Effective Teaching in Schools*. Theory and practice. London: Stanley Thornes.

Lei, L. (2002). Using student-centred learning strategies in the PhysicalChemistry classroom. *The China Papers.* Retrieved May 22, 2014, from, http://science.uniserve.edu.au/pubs/china/vol1/li_lei.pdf

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 (IJSR),* 2(1), 403-408.

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 August 7, 2014, from Google Scholar database:

http://cluster.global2.vic.edu.au/files/2014/03/zone-of-proximal-development-1kbnwld.pdf

Mathematics and Science Teachers Extension Programme. (2002). *Teaching Methods for Physical Science Module 2.*Learner-Centred Teaching. University of Namibia. Windhoek: Centre of External Studies.

Matjila, E. (2004, February 18). *Over 15 000 grade 10 children have failed 2003 examination.* Retrieved April 17, 2014, from htt:www.namibian.com.na./index.php.

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.

Menjo, E. (2013). An assessment of effectiveness of the secondary school science pedagogy and curriculum relevance to students' needs in Baringo Central, Kenya. *Journal of Emerging Trends in Educational Research and Policy Studies (JETERAPS),* 4(3), 433-441.

Mhlongo, M. R., Kriek, J. & Basson, I. (2011). Innovative practice. The contribution of simulations to the practical work of foundation Physics students at the University of Limpopo. *Multicultural Education & Technology Journal,* 5(4), 288-302.

Ministry of Education (2009). *Namibia Senior Secondary Certificate [NSSC]: Physical Science Syllabus Ordinary Level*. Okahandja, Namibia.

Ministry of Education (2010). *The National Curriculum for Basic Education*. Okahandja: NIED.

Ministry of Education. (2011). *Circular: DNEA 22/2012. NSSCO Senior Level examination 2012*.Windhoek: DNEA.

Ministry of Education. (2012). *Circular: DNEA 22/2013. NSSCO Senior Level examination 2013*.Windhoek: DNEA.

Ministry of Education. (2013). *Circular: DNEA 22/2014. NSSCO Senior Level examination 2014*.Windhoek: DNEA.

Ministry of Education. (2012a). *Strategic Plan 2012-2017*. Windhoek: Ministry of Education

Ministry of Education. (2012b).*EMIS Education Statistics.* Windhoek: Ministry of Education.

Ministry of Education. (2013a, June). Educators Must Adhere to Set Policies. In R. Muyunda, (Ed.) *Focus: Progress on Resolutions of 2011 National Education Conference* , p.11-12.

Ministry of Basic Education, Sport and Culture. (2004). The SACMEQ II Report: A study of the conditions of schooling and the quality of primary education in Namibia. Windhoek: Gamsberg Macmillan.

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.

Muijs, D. & Reynolds, D. (2011). *Effective Teaching.* Evidence and practice. London: Sage.

National Planning Commission [NPC]. (2003).*National Development plan 2 and 3.* Windhoek: National Planning Commission.

Neuman, W. L. (2011). *Social Research Methods*. Qualitative and Quantitative Approaches.Seventh Edition. Canada: TexTech International.

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

Ouma, S.O. (2012). Language in science classroom: An analysis of Physics Teachers' use of and beliefs about language. *Research in Science Education,* 42(5), 849-873.

Parker, J. (2004). The Synthesis of Subject and Pedagogy for Effective Learning and Teaching in Primary Science Education. *British Educational Research Journal,* 30 (6), 820-836.

Parson, D. R., Hinson, L. S., & Brown, S. D. (2001). *Educational psychology: A practioner-researcher model of teaching.* West Chester University: Transcontinental Printing.

Patton, M. Q. (1990). *Qualitative Evaluation and Research Methods (2th ed.).* London: Sage Publications.

Petty, G. (2006). *Evidence-Based Teaching. A practical approach*. Cheltenham: Nelson Thornes Ltd.

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

Richards, J. C., & Nunan, D. (Eds.). (2000). *Secondary Language Teacher Education*. Cambridge: Cambridge University press.

Rob, T. (2012). Students' views about secondary school science lessons: The role of practical work. *Research in Science Education,* 42(3), 531-549.

Santrock, J. W. (2009). *Education Psychology (4th ed.)*. Boston: Mcgraw-Hill.

Shadreck, M. & Isaac, M. (2012). Science teacher quality and effectiveness: Gweru Urban Junior Secondary School students' points of view. *Asian Social Science*, *8*(8), 160-164.

Simonds, C. J. & Cooper, P.J. (2011). *Communication for the classroom teacher* (9th ed.). Beaufort: Pearson Education, Inc.

Skinner, D. (2010). *Effective Teaching and Learning in Practice*. New York: The Tower Building.

Smith, C. J. (2012). Improving the school-to-University transition: Using a problem-based approach to teach practical skills whilst simultaneously developing students' independent study skills. *Chemistry Education Research and Practice, 13(4), 490-499.*

Swan, M. & Fisch, I. (2010). *Life skills grade 7*. Windhoek: Pollination Publishers.

Synder, C. W. & Viogts, F. G. (1998). *Inside reform: Policy programming consideration in Namibia basic education reform.* Windhoek: Directorate of Planning and Development, MBEC.

Taraban, R., Box, C., Myers, R., Pollard, R. & Brown, C. (2007). Effects of active learning experiences on achievements attitudes and behaviours in High School Biology. *Journal of Research in Science Teaching*, 44(7), 960-976.

Tjimbundu, M. (2014, March). Namwandi Speaks Out. *Vision 2030 Focus,* p.14.

Vaughn, S. & Bos, C.S. (2012). *Strategies for teaching students with learning and behaviour problems* (8th ed.). Canada: Pearson Education, Inc.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. (M.Cole,V.John-Steiner, S.Scribner, E.Souberman,Eds.), Cambridge: Harvard University press.

Wolfaardt, D. (2012). *Curriculum Development and Practice*. University of Namibia, Windhoek: Centre of External Studies.

Ylanne, S. L., Trigwell, K., Nevgi, A. & Ashwin, P.(2006). How approaches to teaching are affected by discipline and teaching context. *Studies in Higher Education*, 31(3), 285-298.

Appendix 1: Letter requesting permission

UNIVERSITY OF NAMIBIA

Private Bag 13301, 340 Mandume Ndemufayo Avenue, Pionerspark, Windhoek, Namibia

The School of Postgraduate Studies
P.Bag13301
Windhoek, Namibia
Tel: 2063523

E-mail: cshaimemanya@unam.na

Date: 13 June 2014

TO WHOM IT MAY CONCERN

RE: RESEARCH PERMISSION LETTER

1. This letter serves to inform that student: **Johannes M. Nakanyala** (Student number: **200141503**) is a registered student in the Department of ***Mathematics, Science, & Sport Education*** at the University of Namibia. His research proposal was reviewed and successfully met the University of Namibia requirements.
2. The purpose of this letter is to kindly notify you that the student has been granted permission to carry out postgraduate studies research. The School of Post-graduate Studies has approved the research to be carried out by the student for purposes of fulfilling the requirements of the degree being pursued.
3. The proposal adheres to ethical principles.

Thank you so much in advance and many regards.

Yours truly,

Name of Main Supervisor: DR H. M. KAPENDA

Signed:----------

Dr. C. N.S. Shaimemanya

Signed: ----------

Director: School of Postgraduate Studies

Appendix 2: Permission request from the researcher

P.O. BOX 3269,
Ondangwa
Mobile: +264 811 493 606
E-mail: nakanyalajohnrj@gmail.com
06 August 2014

Oshana Directorate of Education
Ministry of Education
Private Bag 5518
Oshakati

Dear Madam

Re: Request for permission to conduct an Educational Research in the Oshana Educational Region.

I am a student at the University of Namibia pursuing a Masters degree in Science Education. I do hereby kindly request permission from your good office to conduct an educational research at secondary schools in the Oshana Educational Region as part of the requirement for my studies during the month of September, 2014. My research topic is: ***Investigating factors affecting the effective teaching of Grade 12 Physical Science in selected secondary schools in the Oshana Region, Namibia.***

If permission is granted, the first phase of the study will involve distributing a questionnaire to all grade 11 and 12 Physical Science teachers in eight selected secondary schools in the Oshana Region. The completing process of questionnaire will take an approximation of 20-30 minutes of the teacher to finish with crossing and they are expected to do this on the voluntary basis. The second phase will involve five teachers from the eight selected secondary schools chosen on the basis of the results of the phase of the research. These will part take in interview and observation. The information gathered from this study will be treated with confidentiality and will be solely used for the purpose of this study only. Participants will have the right to withdraw from this study activity at any time.

I hope that the results of this research will significantly contribute towards improving the teaching and performance of Grade 12 Physical Science in our country.

Hence, I am looking forward to a favourable response from your good office.

Yours Sincerely,

Johannes.M. Nakanyala **[Masters Student-University of Namibia]**

Appendix 3: Consent letter

Dear participant

You are invited to participate in a research project aimed at investigating factors affecting the effective teaching of Grade 12 Physical Science [NSSC] Ordinary Level in our secondary schools in the Oshana Educational Region. The aim of this study is to explore the various factors that affect teachers on applying teaching methods that can enhance learners' performances in Physical Science [NSSC] Ordinary Level national examinations in the region. As a result, your input and feedback are imperative to the study.

Your participation in this study will be; completion of the questionnaire, interviews and classroom observations. Although your participation is voluntary, confidentiality will be guaranteed throughout the study, and you may withdraw at any time you wish not to continue with this study. Please be assured that any information obtained from this study will be used merely for the purpose of this study. Hence, if you are willing to participate in this study; kindly fill in your particulars in this letter below as declaration of your consent.

Yours truly,

JM. Nakanyala - Unam M-Ed student

I .....(Name) agree to participate in the research entitled "**An investigating factors affecting the effective teaching of Grade 12 Physical Science [NSSC] Ordinary Level in our secondary schools in the Oshana Educational Region, Namibia"** as outlined in the consent letter.

Signature: ..... Date: ..... /09/ 2014

Appendix 4: Permission letter from Permanent Secretary

REPUBLIC OF NAMIBIA

MINISTRY OF EDUCATION

Enquiries: Mr C. Muchila
E-mail: Cavin.Muchila@moe.gov.na
Tel: +264 61 2933200
Fax: +264 61 2933922

Private Bag 13186,
WINDHOEK
Namibia

File no: 11/1/1

04 August 2014

To: Mr Johannes Nakanyala
P.O. Box 3269
Ondangwa
Cell: 0811 493 606

Dear Mr Nakanyala

SUBJECT: PERMISSION TO CONDUCT A RESEARCH STUDY IN OSHANA REGION

Your correspondence regarding the subject above, seeking permission to conduct a research study in Oshana Region has reference.

Kindly be informed that the Ministry does not have any objection to your request to conduct a research study at identified schools in the region concerned.

You are, however, kindly advised to contact the Regional Council Office, Directorate of Education, for authorisation to go into the schools and for proper information coordination.

Also take note that the research activities should not interfere with the normal school programmes. Participation by teachers or learners should be on a voluntary basis.

By copy of this letter the Regional Education Director are made aware of your request.

Sincerely yours

MINISTRY OF EDUCATION
Office of the Permanent Secretary
AUG 2014

.....
Mr. Alfred Ilukena
PERMANENT SECRETARY
cc: Directors of Education, Oshana

Appendix 5: Permission letter from the Oshana Region Directorate

REPUBLIC OF NAMIBIA

OSHANA REGIONAL COUNCIL
DIRECTORATE OF EDUCATION
Aspiring to Excellence in Education for All

Private Bag 5518
Oshakati, NAMIBIA

Tel: 065-230057
Fax: 065 – 230035
E-mail: otrc_physical_science@yahoo.co.uk
Enquiries: Maria Udjombala
Ref 12/2/1

8 August 2014

To
Mr. Johannes Nakanyala
P.O. Box 3269
Ondangwa

Dear Mr. Nakanyala

RE: **REQUEST FOR PERMISSION TO CONDUCT RESEARCH STUDY AT SECONDARY SCHOOLS IN OSHANA REGION**

Your correspondence dated 6 August 2014 regarding the above mentioned subject has a reference.

The Office of the Permanent Secretary in the Ministry of Education has granted you permission to conduct research study at selected schools in Oshana Region.

You should present this letter to the principals of the selected schools to make arrangements of the most appropriate time of carrying out your research activities. However, please kindly take note that the research activities should not interfere with the normal programmes of the schools and the participation should be on a voluntary basis.

We wish you the best of luck with your research and hoping that your findings will be shared with other stakeholders in the region and beyond.

Yours Sincerely

11/08/14

MRS. DUTTE N. SHINYEMBA
DIRECTOR OF EDUCATION

DIRECTORATE OF EDUCATION
OFFICE OF THE DIRECTOR OF EDUCATION
11 AUG 2014
PRIVATE BAG 5518
OSHAKATI
OSHANA REGIONAL COUNCIL
REPUBLIC OF NAMIBIA

Appendix 6: Questionnaire for teachers

Introduction

My name is John Nakanyala, a student doing Master in Education Degree at the University of Namibia. I am doing a research to determine your views on *factors affecting the effective teaching of Grade 12 Physical Science [NSSC] Ordinary Level in selected secondary schools in the Oshana Educational Region*. Please answer the following questions as sincerely as possible.

SECTION A: BIOGRAPHIC INFORMATION

1. Your age ---------- 2. Your sex ----------

3. Your highest Education Qualification ----------

4. What are the teaching subjects that you have specialised in? ----------
---

5. Number of years of teaching experience ----------

6. For how many years have you been teaching Grade 12 Physical Science Ordinary

Level? ----------

SECTION B: FACTORS AFFECTING THE EFFECTIVE TEACHING OF GRADE 12 PHYSICAL SCIENCE [NSSC] ORDINARY LEVEL.

Please indicate the extent to which you agree with the statements below by putting a cross (X) in one box per statement.

1. Teaching methods you use in teaching Physical Science Ordinary Level at your school

Teaching methods used	Disagree	Not Sure	Agree
1.1 I use lecture method in my teaching often.			
1.2 I use problem-based learning method often.			
1.3 I use group work method often.			
1.4 I use discussion method often.			
1.5 I use practical method often.			

Other specify:

.....

2. Teacher-learner interactions in the classroom

Statements	Disagree	Not Sure	Agree
2.1 I allow learners to ask questions during teaching.			
2.2 I give learners the opportunity to evaluate their own work (e.g. marking their own class activities, homework etc).			
2.3 I allow learners to teach one another in my class (e.g. learner who understands a certain topic may ask to teach others).			

3. Teachers' content knowledge of Physical Science Ordinary Level at your school

Statements	Disagree	Not sure	Agree
3.1 My lesson introduction engages learners and directs them toward the lesson objectives.			
3.2 I understand all the concepts in Physical Science Ordinary Level to explain to my learners.			
3.3 My English is good enough to make my learners understand Physical Science Ordinary Level topics.			
3.4 It is difficult to prepare my Physical Science Ordinary Level lesson plans in advance for the lesson presentation.			
3.5 I find it difficult to identify appropriate class activities that fit the syllabus' basic competencies.			
3.6 I do not have enough Grade 12 Physical Science knowledge to guide my learners in their learning.			
3.7 I find it difficult to use authentic (real-life) examples from the environment when teaching Physical Science (e.g. fire wood provides energy to cook food we eat).			
3.8 I know how to use examination reports in my teaching of Physical Science content.			
3.9 I cannot handle some of the experiments in the syllabus.			

4. Learners' attitudes toward learning Grade 12 Physical Science Ordinary Level

Statements	Disagree	Not sure	Agree
4.1 Most of my learners are willing to learn Physical Science Ordinary Level.			
4.2 Most of my learners in my class are disciplined.			
4.3 Most of my Grade 12 learners have poor Physical Science background from lower grades.			
4.4 Most of my learners do not pay attention to me during Physical Science lessons.			
4.5 Grade 12 learners believe that Physical Science Ordinary Level is difficult.			
4.6 Most Grade 12 learners do not take Physical Science Ordinary Level work seriously.			
4.7 I experience disciplinary problems among my Grade 12 learners during practical and experimentation in the laboratory.			
4.8 Few of my Grade 12 learners pay attention during practical work in the laboratory.			

5. Availability of Physical Science Ordinary Level resources at your school

Statements	Disagree	Not sure	Agree
5.1 I have adequate teaching and learning materials for Physical Science Ordinary Level (e.g. reference textbooks and past examination question papers etc).			
5.2 We have Physical Science laboratory at our school.			
5.3 The laboratory has all equipment and resources (e.g. chemicals, test-tubes, and measuring cylinders, etc).			
5.4 All my Grade 12 learners have their own textbooks (not sharing textbooks).			
5.5 There is adequate furniture in my classroom.			
5.6 I have my own Physical Science classroom.			

6. Teaching of Physical Science Ordinary Level curriculum

Statements	Disagree	Not sure	Agree
6.1 Time allocated for Physical Science Ordinary Level lessons on my timetable is enough.			
6.2 Double periods for Physical Science Ordinary Level are not available on my timetable.			
6.3 Remedial classes for Physical Science Ordinary Level are not scheduled on my timetable.			
6.4 Most of the Physical Science Ordinary Level textbooks that I use are not matching with the Namibian context.			
6.5 My Physical Science classrooms are over- crowded for me to assist all learners during lessons.			
6.6 I have too many Physical Science lessons per week.			
6.7 Physical Science teachers are not enough at our school.			

7. Socio-economic conditions of Physical Science Ordinary Level learners at your school

Statements	Disagree	Not sure	Agree
7.1 Some of my Grade 12 Physical Science learners come from poor family background.			
7.2 The home environment for some Grade 12 learners is not conducive for studying (e.g. examinations).			
7.3 Some Grade 12 Physical Science learners cannot afford to pay for the hostel and school fees.			
7.4 Some Grade 12 Physical Science learners are frequently absent from school due to household work.			

8. Teachers' commitments toward teaching Physical Science Ordinary Level at your school

Statements	Disagree	Not sure	Agree
8.1 I come to Physical Science lesson on time most of the time.			
8.2 I give class activities after every lesson			
8.3 I give a test after every chapter taught.			
8.4 I mark all my learners' work on time.			
8.5 I provide feedback on time to my learners.			
8.6 I finish the scheme of work every term on time.			
8.7 I finish the syllabus before the final examinations start, every year.			
8.8 I do revision with my learners always before every final examination starts.			

9. Teachers' support to Physical Science Ordinary Level learners at your school

Statements	Disagree	Not sure	Agree
9.1. I make sure that all my learners have relevant textbooks and resources (e.g. latest syllabus).			
9.2 I provide short well planned notes to my learners.			
9.3 I provide clear instructions and guidance for activities and homework.			
9.4 I make sure all class activities and homework are supporting the achievement of basic competencies as indicated in the syllabus.			
9.5 I provides appropriate feedback to my learners both orally and written.			
9.6 I make sure all my learners have done corrections on mistakes in all previous work.			
9.7 I use different teaching methods in teaching Physical Science that support effective teaching.			
9.8 I use variety of activities in my teaching (e.g. presentations, role plays, written work, practical work etc)			

Any other comments: ----------

Thank you for your precious time.

Appendix 7: Questionnaire for principals

Introduction

My name is John Nakanyala, a student doing Master in Education Degree at the University of Namibia. I am doing a research to determine your views on *factors affecting the effective teaching of Grade 12 Physical Science [NSSC] Ordinary Level in selected secondary schools in the Oshana Educational Region*. Please answer the following questions as sincerely as possible.

SECTION A: BIOGRAPHIC INFORMATION

1. Name of school ---------- 2. Your sex ----------

3. Your highest Education Qualification ----------

SECTION B: FACTORS AFFECTING THE EFFECTIVE TEACHING OF GRADE 12 PHYSICAL SCIENCE [NSSC] ORDINARY LEVEL.

Please indicate the extent to which you agree with the statements below by putting a cross (X) in one box per statement.

1. Teacher-learner interactions in the classroom

Statements	Disagree	Not Sure	Agree
1.1 Teacher allows learners to ask questions during teaching.			
1.2 Teacher gives learners the opportunity to evaluate their own work (e.g. marking their own class activities, homework etc).			
1.3 Teacher allows learners to teach one another in class (e.g. learner who understands a certain topic may ask to teach others).			

2. Learners' attitudes toward learning Physical Science Ordinary Level at your school

Statements	Disagree	Not sure	Agree
2.1 Most of learners are willing to learn Physical Science Ordinary level at my school.			
2.2 Most of learners in my school are disciplined			
2.3 Most of Grade 12 learners at our school have poor Physical Science from lower grades.			
2.4 Most of learners pay attention to their teachers during Physical Science lessons.			

2.5 Most Grade 12 learners believe that Physical Science is difficult.			
2.6 Most Grade 12 learners do not take Physical Science work seriously.			

3. Availability of Physical Science resources at your school

Statements	Disagree	Not sure	Agree
3.1 Teachers have adequate teaching and learning materials for Physical Science Ordinary Level (e.g. reference textbooks and past examination question papers, etc).			
3.2 There is a Physical Science laboratory at your school.			
3.3 The laboratory has all equipment and resources.			
3.4 All the Grade 12 learners have their own textbooks (not sharing textbooks).			
3.5 There is adequate furniture in classrooms for learners.			
3.6 Teachers have their own Physical Science classrooms.			

4. Teaching of Physical Science Ordinary Level curriculum at your school

Statements	Disagree	Not sure	Agree
4.1 Time allocated for Physical Science Ordinary Level lessons on the timetable is enough.			
4.2 Remedial classes for Physical Science Ordinary Level are scheduled on timetable.			
4.3 Most of the Physical Science textbooks used by teachers are not matching with the Namibian context.			
4.4 Most of Physical Science classrooms are over- crowded.			
4.5 Teachers have too many Physical Science lessons per week.			
4.6 Physical Science teachers are not enough at our school.			

5. Socio-economic conditions of Physical Science Ordinary Level learners

Statements	Disagree	Not sure	Agree
5.1 Some Grade 12 Physical Science learners at my school come from poor family background.			
5.2 The home environment for some Grade 12 learners is not conducive for studying (e.g. Examinations).			
5.3 Some Grade 12 Physical Science learners cannot afford to pay for the hostel and school fees.			
5.4 Some Grade 12 Physical Science learners absent from school due to household work.			

6. Teachers' commitments toward teaching Physical Science at your school

Statements	Disagree	Not sure	Agree
6.1 Teachers come to Physical Science lessons on time most of the time.			
6.2 Teachers give class activities after every lesson.			
6.3 Teachers give a test after every chapter taught.			
6.4 Teachers mark all learners' work on time.			
6.5 Teachers provide feedback on time to learners.			
6.6 Teachers finish the Scheme of Work every term on time.			
6.7 Teachers finish the Physical Science Ordinary Level syllabus before the final examinations start, every year.			
6.8 Teachers do revision with learners always before every final examination starts.			
6.9 Teachers use different teaching methods that promote effective teaching of Physical Science			

7. Teachers' support of Physical Science Ordinary Level learners at your school

Statements	Disagree	Not sure	Agree
7.1. Teachers ensure that all learners have relevant textbooks and resources (e.g. latest syllabus).			
7.2 Teacher provides short, well-planned notes to learners.			
7.3 Teachers provide clear instructions and guidance for activities and homework.			
7.4 Teachers ensure that all class activities and homework support the achievement of basic competencies as indicated in the syllabus.			
7.5 They provides appropriate feedback to the learners both orally and written.			
7.6 Teachers ensure all learners have done corrections on mistakes in all previous work.			
7.7 I conduct class visit to my Grade 12 Physical Science teacher every week.			

Any other comments: ----------

Thank you for your precious time.

Appendix 8: Questionnaire for advisory teacher

Introduction

My name is John Nakanyala, a student doing Master in Education Degree at the University of Namibia. I am doing a research to determine your views on *factors affecting the effective teaching of Grade 12 Physical Science [NSSC] Ordinary Level in selected secondary schools in the Oshana Educational Region*. Please answer the following questions as sincerely as possible.

SECTION A: BIOGRAPHIC INFORMATION

1. Your sex ----------

3. Your highest Education Qualification ----------

SECTION B: FACTORS AFFECTING THE EFFECTIVE TEACHING OF GRADE 12 PHYSICAL SCIENCE [NSSC] ORDINARY LEVEL.

Please indicate the extent to which you agree with the statements below by putting a cross (X) in one box only.

1. Teaching methods used in teaching Physical Science Ordinary Level at your school

Teaching methods used	Disagree	Not Sure	Agree
1.1 Teacher use lecture method in my teaching often.			
1.2 Teacher use problem-based learning method often.			
1.3 Teacher use group work method often.			
1.4 Teacher use discussion method often.			
1.5 Teacher use practical method often.			

2. Teacher-learner interactions in the classroom

Statements	Disagree	Not Sure	Agree
2.1 Teachers allow learners to ask questions during teaching.			
2.2 Teachers give learners the opportunity to evaluate their own work (e.g. marking their own class activities, homework etc).			
2.3 Teachers allow learners to teach one another in class (e.g. learner who understands a certain topic may ask to teach others).			

3. Teacher's content knowledge of Physical Science Ordinary Level in your region

Statements	Disagree	Not sure	Agree
3.1 Teachers introduce lesson by engages learners and directs them toward the lesson objectives.			
3.2 Teachers understand all the concepts in Physical Science Ordinary Level syllabus and they clearly explain to learners.			
3.3 Teachers' English is good enough to make learners understand Physical Science Ordinary Level topics.			
3.4 Teachers find it difficult to prepare Physical Science lesson plans in advance for presentation.			
3.5 Teachers find it difficult to identify appropriate class activities that fit the syllabus' basic competencies.			
3.6 Teachers do not have enough Grade 12 Physical Science knowledge to guide their learners in their learning.			
3.7 Teachers find it difficult to use authentic (real-life) examples when teaching Physical Science (e.g. fire wood provides energy to cook food we eat).			
3.8 Teachers know how to use examination reports in teaching of Physical Science content.			
3.9 Some teachers cannot handle some of the experiments in the syllabus.			

4. Teachers' commitments toward teaching Physical Science Ordinary Level in your region

Statements	Disagree	Not sure	Agree
4.1 Teachers come to Physical Science lesson on time most of the time.			
4.2 Teachers give class activities after every lesson			
4.3 Teachers give a test after every chapter taught.			
4.4 Teachers mark all learners' work on time.			
4.5 Teachers provide feedback on time to learners.			
4.6 Teachers finish the Scheme of Work every term on time.			
4.7 Teachers do revision with learners always before every final examination starts.			
4.8 Teacher use different teaching methods that promote effective teaching methods of Physical Science.			

5. Learners' attitude toward learning Grade 12 Physical Science in your region

Statements	Disagree	Not sure	Agree
5.1 Most of learners are willing to learn Physical Science Ordinary Level in my region.			
5.2 Most of Grade 12 learners have poor Physical Science background from lower grades.			
5.3 Most of the learners do not pay attention to teachers during Physical Science lessons.			
5.4 Grade 12 learners believe that Physical Science Ordinary Level is difficult.			

6. Availability of Physical Science Ordinary Level resources in your region

Statements	Disagree	Not sure	Agree
6.1 Teachers have adequate teaching and learning materials for Physical Science Ordinary Level (e.g. reference textbooks and past examination question papers etc).			
6.2 Schools have Physical Science laboratory in the region.			
6.3 The laboratory has all equipment and resources at schools.			
6.4 All the Grade 12 learners have their own textbooks (not sharing textbooks).			
6.5 There is adequate furniture in classrooms for learners at schools.			
6.6 Teachers have their own Physical Science classroom at schools.			

7. Teaching of Physical Science Ordinary Level curriculum in your region

Statements	Disagree	Not sure	Agree
7.1 Time allocated for Physical Science Ordinary Level lessons on the timetable is not enough.			
7.2 Remedial classes for Physical Science Ordinary Level are available on the timetable.			
7.3 Most of the Physical Science Ordinary Level textbooks used by the teachers are not matching with the Namibian context.			
7.4 Physical Science classrooms are overcrowded.			
7.5 Teachers have too many Physical Science lessons per week.			
7.6 Physical Science teachers are not enough at the schools in your region.			

8. Teachers' support to Physical Science learners at schools in your region

Statements	Disagree	Not sure	Agree
8.1. Teachers ensure that all the learners have relevant textbooks and resources (e.g. latest syllabus).			
8.2 Teacher provides short, well-planned notes to learners.			
8.3 Teachers provide clear instructions and guidance for activities and homework given to learners.			
8.4 Teachers ensure that all class activities and homework are supporting the achievement of basic competencies in the syllabus.			
8.5 Teachers provide appropriate feedback to their learners both orally and written.			
8.6 Teachers ensure all learners have done corrections on mistakes in all previous work.			
8.7 I conduct class visit to my Grade 12 Physical Science teachers very often.			
8.8 I provide Grade 12 Physical Science Ordinary Level syllabus and Scheme of Work to teachers every year in my			

region.			

Any other comments: ----------

Thank you for your precious time.

Appendix 9: Interview questions for teachers

Introduction

My name is John Nakanyala, a student doing Master in Education Degree at the University of Namibia. I am doing a research to determine your views on *factors affecting the effective teaching of Grade 12 Physical Science [NSSC] Ordinary Level in selected secondary schools in the Oshana Educational Region*. Please answer the following questions as sincerely as possible.

Questions

1. In your opinion, why do you use group work method in your teaching the Grade12 Physical Science [NSSC] Ordinary Level?

2. In your opinion, why do you use problem-based learning method in your teaching the Grade12 Physical Science [NSSC] Ordinary Level?

3. In your opinion, why do you use practical method in your teaching the Grade12 Physical Science [NSSC] Ordinary Level?

4. How often do you use the following teaching methods in your teaching?

Teaching methods	**Never**	**Seldom**	**Often**
1. Group work			
2. Problem-based learning			
3. Practical work			

5. What other teaching methods, do you think is good for teaching Grade12 Physical Science [NSSC] Ordinary Level?

6. In your opinion, what do you think are the factors affecting the use of:

(i) Group work;

(ii) Problem-based learning;

(iii) Practical work methods in teaching of Grade 12 Physical Science [NSSC] Ordinary Level in the Oshana Educational Region?

7. Why do you finish your Grade 12 Physical Science [NSSC] Ordinary Level syllabus and scheme of work on time?

8. Why do you give class activities, after every lesson to your Grade 12 Physical Science [NSSC] Ordinary Level learners?

9. Why do you think most of your learners are not willing to learn Grade 12 Physical Science [NSSC] Ordinary Level?

10. What would you comment on your learners' discipline in your Grade 12 Physical Science [NSSC] Ordinary Level lessons?

11. Why do you think majority of your learners do not pay attention during practical work in the laboratory?

12. What do you do to teach Grade 12 Physical Science practical work to your learners in the laboratory with a limited of resources?

13. Why do you think time allocated for Grade 12 Physical Science lessons on your time-table is not enough?

14. Why do you think is important to have remedial classes for Grade 12 Physical Science [NSSC] Ordinary Level on your time-table?

15. Do you think is important for the advisory teacher in your region to conducts sufficient Grade 12 Physical Science [NSSC] Ordinary Level workshop every term? Why?

16. In your views, what strategies can be implemented to improve the teaching of Grade 12 Physical Science [NSSC] Ordinary Level in the Oshana Education Region?

Thank you very much for your time.

Appendix 10: Interview questions for advisory teacher

Introduction

My name is John Nakanyala, a student doing Master in Education Degree at the University of Namibia. I am doing a research to determine your views on *factors affecting the effective teaching of Grade 12 Physical Science [NSSC] Ordinary Level in selected secondary schools in the Oshana Educational Region*. Please answer the following questions as sincerely as possible.

Questions

1. In your opinion, do you think group work method is good for teaching the Grade12 Physical Science [NSSC] Ordinary Level? Why?

2. In your opinion, do you think problem-based learning method is good teaching for the Grade12 Physical Science [NSSC] Ordinary Level? Why?

3. In your opinion, do you think the practical work method is also appropriate in teaching Grade12 Physical Science [NSSC] Ordinary Level? Why?

4. What other teaching methods, do you think is good for teaching the Grade12 Physical Science [NSSC] Ordinary Level?

5. In your opinion, what do you think are the factors affecting the use of:

(i) Group work;

(ii) Problem-based learning;

(iii) Practical work methods in teaching of the Grade 12 Physical Science [NSSC] Ordinary level in your region?

6. Why do you think the Grade12 Physical Science teachers do not give test after every chapter they taught?

7. Why do you think the Grade12 Physical Science teachers do not mark all learners' work and provide feedback on time to their learners?

8. What effects do the Grade12 Physical Science teachers pose to their learners for not finishing their scheme of work on time?

9. The laboratories of the secondary schools in your region do not have adequate equipment and resources. What do you do to help your Grade12 Physical Science teachers to undertake practical work with their learners?

10. Why do you think time allocated for Grade 12 Physical Science [NSSC] Ordinary Level lessons on the time table is enough?

11. What professional assistance (for example class visits, learners' work inspection etc) do you give to the Grade12 Physical Science teachers in your region? Why?

12. What strategies does the region intend to put in place to improve the teaching of Grade12 Physical Science [NSSC] Ordinary Level in your region?

13. In your views, what can teachers do to improve the teaching of Grade 12 Physical Science [NSSC] Ordinary Level in your region?

Thank you very much for your time.

Appendix 11: Lesson observations Schedule

School code: ..... Teacher Code: ..... Date: ...../...../ 2014

Grade: ..... Topic: .....

1. Environment in which teaching and learning takes place.

1.1 Class size		
		Less than 20 learners
		22-31 learners
		32-41 learners
		42-51 learners
		52-61 learners
		62 or more learners

1.2 Class arrangement		
		Big circle
		Semi-circle
		Small groups
		Rows and columns
		Random

1.3 Physical classroom environment		
		Tidy
		Well organized
		Clean
		Enough space learners can move freely
		Rich visual displays

2. Teachers' time management

Teachers	Arrival time to lessons				
	Lesson 1	**Lesson 2**	**Lesson 3**	**Lesson 4**	**Lesson 5**

3. To what extent do teachers use the following teaching methods in their classroom? Rate each of the statements listed in the table below.

Statements	Not use at all	Satisfactory	Very satisfactory
2.1 Learners are free to ask questions during teaching and learning process.			
2.2 Learners talk and act more than sit and listen.			
2.3 Learners are sharing information in groups.			
2.4 Learners are given the opportunity to respond to other learners' contributions.			
2.5 Learners do practical work as required by the syllabus (for this particular lesson).			
2.6 Teacher encourages all the learners to participate in the learning activities during lesson.			
2.7 Teacher encourages problem-based learning (e.g. different between pure metal and alloys).			
2.8 Learners are allowed to teach one another.			

Other comments: ----------

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4. Is the classroom having the following teaching and learning aids on the notice board?

Teaching-learning aids	Yes	No
3.1 Physical Science Ordinary Level latest syllabus copy.		
3.2 Posters display the subject content (e.g. teacher-made and learner-made materials etc).		
3.3 Time-table for all Physical Science Ordinary Level lessons.		
3.4 Time table for practical work.		

Other (specify): ----------

NB: Ask whether learners were given soft or hard copy of the Physical Science syllabus.

5. Do you think the classroom is conducive for teaching and learning? (e.g. every learner has their own furniture, textbooks, exercise books, unbroken windows, notice board with

subject posters, lesson time table, periodic table, cleaning list and good seating arrangement etc. **Yes** [ ] **No** [ ]

6. Teachers' subject knowledge of teaching Physical Science.

Statements	Yes	No
4.1 Teacher's lesson introduction engages learners and directs them toward the lesson objectives.		
4.2 Teacher explains clearly the difficult concepts to learners.		
4.3 Teacher uses real-life examples in their teaching (e.g. fire wood provides heat energy for cooking to take place).		
4.4 Teacher has good questioning skills.		
4.5 Teacher probes and explores learners' subject experience (e.g. asking what and why questions)		
4.6 Teacher communicates clearly with learners through questioning, instruction, explaining and feedback.		
4.7 Teacher uses a variety of activities in teaching (e.g. presentations, role plays, written work, practical work etc).		

Other comments: ----------

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7. Teachers' conduct and their role during teaching/learning process.

Statements	Yes	No
5.1 Teacher is friendly towards the learners.		
5.2 Teacher attends to individual learner's problem.		
5.3 Teacher discriminates among learners (e.g. teacher concentrate most to one genders in the classroom).		
5.4 Teacher acts as a facilitator (by moving around class giving assistance where possible) during group work, practical and experimentation.		
5.5 Teacher dominates the teaching/learning process (e.g. teacher using expository teaching method) most of the lesson.		
5.6 Teacher provides short well planned notes to learners.		
5.7 Teacher provides frequent and appropriate feedback orally and written.		
5.8 Teacher ensures that all class activities and homework support the achievement of basic competencies as indicated in the syllabus.		
5.9 Teacher ensures that all activities/home work is marked and corrections on mistakes are made.		

Other comments: ----------

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8. Which of the following teaching methods does teacher use in teaching/learning process of the lessons observed?

Lessons (L)	**L_1**	**L_2**	**L_3**	**L_4**	**L_5**
Lecture method					
Group work					
Practical work					
Problem-based learning					

Other (specify): ----------

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9. Availability of teaching/learning resources and equipment or items.

Items	**Inadequate**	**Satisfactory**	**Adequate**
7.1 Tables			
7.2 Chairs			
7.3 Textbooks			
7.4 Exercise books			
7.5 Laboratory facilities (e.g. equipment)			

Other comments: ----------

End of observations schedule