

An Investigation into the Knowledge and Practices
of Learner-centred Methods of Teaching by
Physical Science Teachers in the Omusati Education
Region

Master of Education

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**AN INVESTIGATION INTO THE KNOWLEDGE AND
PRACTICES OF LEARNER-CENTRED METHODS OF
TEACHING BY PHYSICAL SCIENCE TEACHERS IN
THE OMUSATI EDUCATION REGION**

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This thesis has been examined and is approved as meeting the required standards for partial fulfillment of the requirements for the degree of Master of Education.

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STATEMENT OF ORIGINALITY

I declare that **AN INVESTIGATION INTO THE KNOWLEDGE AND PRACTICES OF LEARNER-CENTRED METHODS OF TEACHING BY PHYSICAL SCIENCE TEACHERS IN THE OMUSATI EDUCATION REGION** is my work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references and neither has it been, nor will it be, submitted for the award of any other degree.

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DEDICATION

This thesis is dedicated to my better half, Femi, and to my little angels, Tope, Ayo and Toyosi.

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TABLE OF CONTENTS

	Pages
Approval page.....	i
Statement of originality.....	ii
Copyright.....	iii
Dedication.....	iv
Acknowledgements.....	v
Table of Contents.....	vii
List of Tables.....	xi
Abstract.....	xiii
List of Acronyms.....	xvi
CHAPTER ONE: INTRODUCTION.....	1
Background information.....	1
What is Learner-Centred Education (LCE)?.....	2
Why LCE in Science in Namibia?.....	3
Statement of the problem.....	5
Questions of the study.....	6
Significance of the study.....	6
Limitations of the study.....	7
Delimitations of the study.....	7

Definition of terms.....	8
Summary.....	8
CHAPTER TWO: REVIEW OF RELATED LITERATURE.....	9
Introduction.....	9
Teachers’ understanding of LCE.....	9
Learner-centred methods of teaching.....	11
Training of Teachers in implementing LCE.....	17
Implementation of LCE.....	18
Problems encountered in the implementation of LCE.....	18
Overcoming the problems encountered in the implementation of LCE.....	19
Conclusions from literature review.....	20
Summary.....	21
CHAPTER THREE: METHODOLOGY.....	22
Introduction.....	22
Research Design.....	22
Population.....	23
Sample and Sampling procedures.....	23
Research instruments.....	23
Data collection procedures.....	25
Data analysis procedure.....	26
Summary.....	26

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND INTERPRETATION27

Introduction.....27

Personal attributes of the respondents.....27

The Physical Science Teachers' knowledge of the learner-centred approach to teaching.....30

Training on LCE and learner-centred methods of teaching.....32

Respondents' practices of the learner-centred approach to teaching Physical Science.....33

Methods of teaching frequently used by the Physical Science Teachers.....44

Problems faced by the Physical Science Teachers in the implementation of the learner-centred methods of teaching and the solutions.....55

Physical Science Teachers' attitudes towards the learner-centred methods of teaching.....60

Availability of teaching and learning resources.....61

Summary.....62

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.....63

Introduction.....63

Summary.....63

Findings.....64

Conclusions.....66

Recommendations.....67

REFERENCES.....68

APPENDICES.....73

Appendix 1: Letter to the Regional Director, Omusati

Education Region.....74

Appendix 2: Letter to the Principals of Participating Schools.....75

Appendix 3: Letter to the Physical Science Teachers.....76

Appendix 4: Questionnaire for the Physical Science Teachers.....77

Appendix 5: Observation Schedule.....85

Appendix 6: Standardized Open-ended Interview87

LIST OF TABLES

Table		Page
1	Ages of the respondents.....	27
2	Highest professional qualification of the respondents.....	28
3	Teaching experiences of the respondents.....	29
4	Reasons for using different teaching methods by the respondents.....	31
5	Post-service teacher training on LCE received by the respondents.....	32
6	Respondents' responses on how often they used each learner-centred aspect...	33
7	A checklist of respondents' learner-centred practices.....	37
8	Methods of teaching used by respondents from the questionnaire.....	38
9	Methods of teaching used by respondents from the standardized open-ended interview.....	39
10	A checklist of methods of teaching that respondents used.....	40
11	Respondents' responses to how often they used different learner-centred methods of teaching from the questionnaire.....	42
1	Methods of teaching that respondents used frequently in their teaching and the reasons for the frequent use, from the questionnaire.....	45
2	Methods of teaching that respondents used frequently in their teaching and the reasons for the frequent use, from the standardized open- ended interview.....	48
3	Learners' responses to the most frequently used methods of teaching by the respondents from the questionnaire and the standardized open-ended interview).....	50

4	Methods of teaching that respondents rarely used in their teaching and the reasons for rarely using them from the questionnaire.....	53
5	Problems the respondents faced in their implementation of the learner-centred methods of teaching and the solutions from the questionnaire....	56
6	Problems the respondents faced in their implementation of the learner-centred methods of teaching and the solutions from the standardized open-ended interview.....	58
18	Respondents' attitudes towards selected learner-centred practices.....	60
19	Availability of equipment and materials for teaching and learning.....	61

ABSTRACT

This study was undertaken to determine the knowledge and practice of learner-centred methods of teaching by Physical Science Teachers in the Omusati Education Region. The study addressed the following questions: a) What is the Physical Science Teachers' understanding of the concepts learner-centred education (LCE) and learner-centred methods of teaching? b) What type of training have the Physical Science Teachers received to facilitate the use of learner-centred methods of teaching in their classrooms? c) How do Physical Science Teachers implement learner-centred methods of teaching in the classroom? d) What problems do Physical Science Teachers face in the use of the learner-centred methods of teaching in the classroom? and e) How are the Physical science teachers overcoming the problems preventing the effective use of the learner-centred methods of teaching?

Using the case study method and purposeful sampling procedures, data were collected through observation schedules, standardized open-ended interviews and questionnaires from nine Physical Science Teachers in selected secondary schools in the Omusati Education Region. The study found that the Physical Science Teachers used only a few learner-centred methods of teaching in the classroom, including the question and answer method, the discussion method and the independent inquiry method.

The study also revealed that Physical Science Teachers engaged in few learner-centred practices that promoted active participation of learners in the teaching/learning process.

Such practices included giving students the opportunities to ask questions, allowing students to respond to other students' contributions, encouraging all students to participate in the teaching/learning process, teachers responding to the learners' questions, the teacher sometimes allowing the students to teach each other at some stage in the lesson and allowing learners to work individually mostly through classroom exercises. However, the Physical Science Teachers did not involve learners in the evaluation of their own work, did not encourage learners to work in groups although in some schools, the classroom arrangement was learner-centred i.e. learners sat in groups. Learners were not involved in the selection and organization of the learning activities, they were not allowed to move freely in the classroom and peer tutoring was not encouraged. In addition, the teachers preferred those learner-centred methods of teaching and practices that enabled them to retain control over the teaching and learning process. Further, the study showed that Physical Science Teachers had knowledge of the various learner-centred methods of teaching, however they were skeptical about their sole use and preferred the lecture method which is teacher-centred. In addition, it was found that they lacked adequate chairs, teaching and learning aids and laboratory equipment that could help to foster the teaching of Physical Science in a learner-centred way.

In the light of the above findings, the study recommends that teachers should use all the different learner-centred methods of teaching which includes the following methods, group work, discussion, project work, question and answer, independent inquiry, peer

tutoring, practical and experimentation, discovery, field trips and simulations to cater for individual needs and to maximize learner participation in the teaching/learning process. The study also recommends that the Physical Science Teachers be given adequate resources such as science equipment and teaching aids. This could encourage them to adopt various learner-centred methods of teaching. In addition, the study further recommends that the time allocated for teaching Physical Science be increased from 45 minutes to 90 minutes in order to give the teachers ample time to organize the lesson especially practical lessons in a learner-centred way.

LIST OF ACRONYMS

MEC – Ministry of Education and Culture

MBEC - Ministry of Basic Education and Culture

MBESC – Ministry of Basic Education, Sports and Culture

MOE – Ministry of Education

LCE – Learner-Centred Education

TCE – Teacher-Centred Education

NIED – National Institute for Educational Development

BETD – Basic Education Teacher Diploma

MASTEP – Mathematics and Science Teachers Extension Programme

INSET – In-Service Training

NSSC – Namibian Senior Secondary Certificate

CHAPTER ONE

INTRODUCTION

Background information

Before independence in 1990, education in Namibia used to be enjoyed by the privileged few, whom the apartheid and colonialist regime considered worthy of it. In other words, it was not the right of every citizen to have access to learning and its benefits (Ministry of Education and Culture (MEC), 1993). Few children went to school. Of those who did go to school, most did not go far. Initially, education for Black Namibians was justified in terms of its vocational utility. For the most part, its task was to prepare people for the specific jobs that German and then South African rule required. Except for a very small number of people who were to become messengers, clerks and other functionaries in the administrative system, basic literacy and numeracy was deemed sufficient (MEC, 1993:2).

After independence, the new Ministry of Education and Culture faced the formidable challenge of addressing this unfortunate heritage. It developed programmes and projects for education improvement, renewal, and reform. This led to the development and designing of a new curriculum that would reflect the needs of the learners (MEC, 1993).

The teaching methods of Bantu education in schools before independence tended to foster memorization and rote repetition. For example in science, the learners were expected to carry out experiments, but the schools in rural areas had in general no laboratories, test tubes or science facilities. In addition some learners had no space to learn or had to learn under a tree without desks (Chaka, 1998). Under such conditions, one could not expect learners to learn effectively, especially if what they were

supposed to learn was not available in their environment. Thus, when the new educational policy for post independent Namibia was formulated, learner-centred education (LCE) was chosen as a basis for the reform (Ministry of Basic Education, Sport and Culture (MBESC), 1999). According to MEC (1993:10), “Teacher-centred instruction is inefficient and frustrating to most learners, and certainly is not consistent with education for all. Hence, we shall have to help both our teachers and learners become skilled at developing and working in learner-centred settings”.

Since Learner-centred education (LCE) was introduced in 1991 as foundation policy for the new educational system of Namibia, there have been different understandings of what is meant by Learner-centred method of teaching and how to put it into practice. A growing body of research in Namibia (Marope & Noonan, 1995; Sibuku, 1997; Shinyemba, 1999) had shown that the curricula and syllabi, textbooks and materials, assessment and examinations developed during the 1990s were not consistently based on learner-centred principles. Consequently, the perceptions and attitudes of teachers and teaching in the classrooms were not consistent either with the LCE principle.

What is Learner-Centred Education (LCE)?

The term LCE is a very old concept in the education setting. Its origin could be traced back to the work of some well-known philosophers and educators such as Confucius, Socrates, Jean-Jacques Rousseau, just to mention a few (Cuban, 1984; Henson, 2003). LCE relies more on the theory of social constructivism, because social constructivism takes into account the social nature of the learning environment as a collaborative atmosphere between the teachers and learners (Gergen, 1995; Murphy, 1997; McCombs & Whistler, 1997).

The view of the learner and learning described in the development brief (NIED, 2003) and curricula is within the broad parameters of constructivism, tending towards social

constructivism. Social constructivism is a paradigm for understanding knowledge, intelligence and learning, which developed during the course of the last century and is now beginning to cohere (NIED, 2003). Social constructivism goes further and explores the implications of learning as a dialectic interaction between ourselves and our community, socio-cultural and material environment, through which we internalize our experiences and actively construct our knowledge and understanding, thereby changing our community and environment in turn (Donaldson, 1992; Murphy, 1997; NIED, 2003). Dewey is considered to be the “founding father” of social constructivism, and researchers such as Vygotsky, Brunner, Gardner and Gilligan, amongst others, have made seminal contributions to developing a social constructivist understanding of learning (Donaldson, 1992; Gergen, 1995; Murphy, 1997; NIED, 2003).

Further, Glasgow (1996:34) indicates that LCE involves an approach where “students learn to decide what they need to find success within the class and educational format”. Learner-centred education places the student at the centre of education. It begins with understanding the educational contexts from which a student comes. It continues with the instructor evaluating the student's progress towards learning objectives. By helping the student acquire the basic skills to learn, it ultimately provides a basis for learning throughout life. It therefore places the responsibility for learning on the student, while the instructor assumes responsibility for facilitating the student’s education. This approach strives to be individualistic, flexible, competency-based, varied in methodology and not always constrained by time or place (Brandes and Ginnis, 1996; McCombs and Whistler, 1997; Gunderman, Williamson, Frank, Heitkamp and Kipfer, 2003; Henson, 2003; Mahendra, Bayles, Tomoeda and Kim, 2005).

LCE is an approach to teaching and learning that comes directly from the national goals of equity (fairness) and democracy (participation). It is an approach that means that teachers put the needs of the learners at the centre of what they do in the classroom, rather than the learner being made to fit whatever needs the teacher has decided upon. This means that activities which put the learner at the centre of teaching and learning

must begin by using or finding out the learners' existing or prior knowledge, skills and understanding of the topic (MBESC, 1999; Van Harmelen, 1999; NIED, 2003; Barends, 2004).

Why LCE in science in Namibia?

Many authors (Kagan, 1995; Glasgow, 1996; Henson, 2003) had indicated that learner-centred teaching was necessary and relevant in the classroom because we live in a changing world. Present day life is very different from the lives our parents knew as children. There have been enormous technological and social changes and the pace of change continues. It is difficult for us to predict exactly what knowledge is likely to be useful for our learners when they are adults. Because of this, learners need to know how to find the information they will need and to select it for themselves. Knowledge very quickly become outdated or less useful, so learning a body of knowledge is no longer enough. Learners must learn to think for themselves and become independent learners.

Thekwane (2001) saw LCE as a means of achieving the goals of education in Namibia. He noted that because we live in an ever increasingly scientific and technological world, changing demands from society and the continual development in the field of technology led to a radical change in the aims and objectives of school science since independence in Namibia. And as a result of this, the Ministry of Basic Education, Sports and Culture adopted a new approach to teaching school science, namely the learner-centred teaching approach which was expected to be adopted by all teachers and fully implemented in the classroom in order to achieve the goals of education in Namibia.

The main principle of LCE is to use the social context of the learner as a resource and to relate learning to the social context. Hence, learner-centred methods of teaching

Physical Science will provide learners with activities and experiences which will stimulate them to learn, think logically and question for themselves (MBEC, 1998; Lilemba, 2002; NIED, 2003). Learners must experience practical work in science. Learner-centred methods of teaching Physical Science will also help learners to participate, discuss and solve problems through collaborative learning (MEC, 1993; NIED, 2003; Barends, 2004).

Barends (2004) also stated that discipline is strengthened in the classroom when learners are actively involved in decision-making and share responsibility, they tend to co-operate and become more enthusiastic about their work. The learner-centred methods of teaching Physical Science will help learners apply knowledge and skills and help them listen critically and supportively; it would also help them organize and summarize information, and help them to investigate, interpret, and communicate (MBESC, 1999; Brandes and Ginnis, 1996).

Many authors (Van Harmelen, 1999; MBESC, 1999; NIED, 2003) also indicated that the learner-centred method of teaching had to be introduced in Namibia to ensure active participation of the learners in the teaching/learning process because the focus is on the learning activities and personal development of the learner. Teaching using the learner-centred method allows for communicative and interactive process of learning through pair or group work. This facilitates learning by doing, and self- and peer-assessment (Njabili, 1995; Brandes and Ginnis, 1996; McCombs and Whistler, 1997; Imasiku, 1999).

Further, more learner-centred methods of teaching allow the learner to be co-responsible in shaping and administering the learning environment due to the roles assigned to learners in the classroom (Brandes and Ginnis, 1996; McCombs and Whistler, 1997; MBESC, 1999; Henson, 2003; Stears and Malcolm, 2005). Learners are accepted as having human rights and deserve respect. Their hopes, needs and fears

are acknowledged. They are no longer seen as objects of learning who are empty waiting to be filled by the teacher but seen as subjects of learning and partners in education (MEC, 1993; MBEC, 1998; 1999; Lilemba, 2002; NIED, 2003).

Thus, the learner sees him/herself differently as a result of the learning experiences because learner-centred methods of teaching enhance their knowledge helping them to become more self-confident and self-directing (Brandes and Ginnis, 1996). In addition, we need learner-centred methods of teaching if we are to preserve democracy. Exclusive use of autocratic, teacher-dominated classroom structures leave students unprepared for participation in a democratic society (Kagan, 1995).

Statement of the Problem

Progress towards adoption of the learner-centred methods of teaching by teachers has been slow. Van Graan (1998:60) observes that the learner-centred approach to teaching “has a long way to go, it is not progressing as expected”. Further, Physical Science is a practical subject that is amenable to the use of learner-centred approach to teaching where learners can take very active roles in the teaching and learning process. Against this background, the researcher found it necessary to determine the knowledge and practices of learner-centred methods of teaching by the Physical Science teachers in selected Senior Secondary Schools in the Omusati Education Region.

Questions of the Study

The following questions were addressed:

1. What is the Physical Science teachers’ understanding of the concepts learner-centred education (LCE) and learner-centred methods of teaching?

2. What type of training have the Physical Science teachers received to facilitate the use of learner-centred methods of teaching in their classrooms?
3. How do Physical Science teachers implement learner-centred methods of teaching in the classroom?
4. What problems do Physical Science teachers face in the use of the learner-centred methods of teaching in the classroom?
5. How are the Physical Science teachers overcoming the problems preventing the effective use of the learner-centred methods of teaching?

Significance of the Study

The researcher hoped that the results of this study would provide some insights into the knowledge and practice of LCE and learner-centred methods of teaching by Physical Science teachers in selected Senior Secondary Schools in the Omusati Education Region. They could be useful to teachers, school principals, advisory teachers, school inspectors, educational planners, administrators, decision makers, school boards and other stakeholders in education. The findings of this investigation could be helpful in informing the policy makers and the Ministry of Education (MOE) officials, in Namibia about the everyday practice of learner-centred methods of teaching in the Physical Science classrooms. The information would hopefully help inform their decisions about putting in place strategies and support programmes that might help teachers to effectively translate the policy of LCE into practice. The information could also be used by principals and teachers to improve the use of learner-centred methods of teaching in their schools which might in turn improve the teaching/ learning process for learners.

In addition, for the attainment of quality education, there is need to have well-trained, experienced and knowledgeable teachers in our schools especially the Senior

Secondary Schools, that could effectively teach using the learner-centred approach which would assist learners taking Physical Science to think independently and critically. These aspects are essential in mastering the strategies for identifying, analyzing, solving problems and developing self confidence (MEC, 1993) and to receive the best quality education possible.

Limitations of the Study

For a more comprehensive study involving many Physical Science teachers nationwide, there was need for a substantial amount of time, human and financial resources. The researcher was unable to embark on this type of study due to limited financial resources, time constraints and long distances from school to school all over the country. The available time, money and human resources were inadequate for a more comprehensive and thorough in-depth nation-wide study.

Delimitation of the Study

The study was limited to four Senior Secondary Schools that offer Physical Science in the Omusati Education Region. Participating teachers were located within a radius of 50km of Oshikuku, a village in the Northern part of Namibia.

Definition of Terms

Learner-centred methods of teaching are methods of teaching that promote active learner participation, encourage self initiated learning; involve the process of inquiry

and discovery and promote understanding of what is being presented in the teaching/learning process (Brandes and Ginnis, 1996; McCombs and Whistler, 1997; Henson, 2003).

Teacher-centred methods of teaching are methods of teaching where attention and activities focus on the teacher. Learners usually sit quietly, passively and listen to the teacher. In teacher-centred methods of teaching, the teacher is expected to have the knowledge required for the teaching/learning process which he/she has to pass on to the learners. As a result, the teacher does most of the talking and thinking during the lessons (Brandes and Ginnis, 1996; McCombs and Whistler, 1997; Henson, 2003).

Students and Learners will be used interchangeably in this study and they will be understood to mean a person trying to gain knowledge or acquire a skill in something through study or experience in a school.

Summary

This chapter gave a general overview of the principles of LCE and the reasons why the Namibian government adopted these principles after the independence. The next chapter discusses the various literatures on LCE and the various learner-centred methods of teaching.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

Two central features of post-independent Namibian education policy are that it should be learner-centred and that it should be life-long. These features are set out in the policy document *Toward Education for All* (MEC, 1993). Thorough reviews of literature revealed that quite a number of studies have been done in Namibia on LCE and learner-centred methods of teaching in various contexts. Very little if any has been done in the context of the Physical Science classroom. Therefore, the literature review will focus on LCE in those various contexts.

Teachers' understanding of LCE

Researches and monitoring done on teachers' and teacher educators' perceptions and practice of learner-centred education by Sibuku (1997), Van Graan (1998), Shinyemba (1999), and Pomuti (2000), reveal that although many teachers are familiar with the term, only a few of them have a deeper understanding of the concept and its implications.

Van Graan (1998) indicated that most teachers were aware of the term "learner-centred education" but many perceived it to be mostly group work activities. She however noted that the teachers used various techniques in their teaching to support learners in their learning but they did not necessarily perceive these techniques to be learner-centred. She further indicated that few of the observed group work activities reflected

real co-operative learning where there was an authentic sharing of knowledge, or support of one another in learning. In most of the observations she conducted, learners worked individually whenever there was an opportunity. She concluded that classroom practice was beginning to change but in most cases, in a superficial way simply by inclusion of group work as a method.

However, Van Harmelen (1999) noted that there are many myths or misconceptions that have come to be associated with the LCE theory and that learner-centred is interchangeably used as child-centred by teachers. She argued that “child-centred education (CCE) is essentially linked to a particular perception of childhood, whereas learner-centred education is concerned with how learning occurs and how knowledge is acquired by all learners” (p.1).

Van Harmelen (1999) further argued that, as long as teachers hold on to this myth of LCE to be CCE, their practice will not be learner-centred but child-centred. She further noted that the myth of CCE has infiltrated the learner-centred classrooms and thus, have affected the practice of teachers. Since current educational reform processes promote the term LCE rather than CCE, we must assume that educational reform in Namibia, as elsewhere, is located in a theory that differs from child-centred education. Therefore, teachers are expected to change their classroom practice accordingly.

According to Marope and Nooman (1995:34), “...while the use of learner-centred teaching is going on fairly smoothly in some educational institutions, problems are being experienced. For instance, the official meaning of the learner-centred approach to learning does not seem to be focused enough to guide the practicing teachers in the schools.” Marope and Nooman also indicated that there is in existence a lack of integration of concepts especially between learner-centredness and assessment. Even the implementation of LCE has not been learner-centred. Hence, learner-centred teaching implies different things to different teachers.

On the other hand, Chaka (1998) views a learner-centred curriculum as holistic in nature because it is integrated. Integrated and holistic refer to the notion of connectedness in the sense that the learner will be able to make connections of what he or she learns. While Imasiku (1999), indicated that learner-centred education focuses on the learner and not the teacher, which has implications on the role of the teacher and the teaching approach in terms of teaching and learning, for instructional materials, and for the way teaching is organized. The teacher has to become a coach or a guide rather than an expert. The learners are to be empowered to think and take responsibility not only for their own but also for other people's learning and development.

Learner-centred methods of teaching

A number of methods are associated with LCE (Brandes and Ginnis, 1996; Bruce and Marsha, 1996; Glasgow, 1996; Dunne and Wragg, 1997). No single method is superior, particularly in terms of student performance. Consequently, in LCE, methods of teaching must be matched to objectives and intended tasks for efficiency and effectiveness. Some Learner-centred methods of teaching which were mostly relevant to the teaching and learning of science particularly Physical Science was discussed below:

Individualized method

The basic characteristic of this method is that learners complete tasks according to their ability level and proceed with learning at their own pace. There are basically two forms of individualized learning:-

- Highly structured individualized learning tasks where learners proceed through a sequence of learning tasks at an individual pace at an appropriate level of complexity;
- Unstructured or independent learning where learners pursue and resolve problems of their interest.

This method gives students the opportunity to perceive and resolve personal interests. It also meets students' needs more appropriately and allows for progress at own pace because some tasks can be done outside school hours (Njabili, 1995; Barnes, 1999). This approach could be very appropriate particularly for Physical Science which may involve practical and research work (Brandes and Ginnis, 1996; Dunne and Wragg, 1997). Students could be asked to find information about certain topics. For example, on Air and Water, students could be required to find out the sources and effects of pollutants on Air and Water.

The main disadvantage of this method is that the teacher will have less control over the students' learning in that he/she cannot be sure of the breadth and depth of content acquired by learners (Dunne and Wragg, 1997; Mpofu, 2002).

Group work

Group work is a technique that uses interactions between learners as part of the learning process. Students are divided into groups of three or four depending on the size of the class. The groups are assigned to specific tasks to perform under the supervision of the teacher. Group work gives students the opportunity to work together (Kagan, 1995; Brandes and Ginnis, 1996; Dunne and Wragg, 1997; Cullingford, 1998; Slavin, 1994). Important social skills are developed as well as what is being learnt through the work, the group would be doing. The teachers can use this technique to

share understanding about an issue through facilitating discussion in groups. He/she helps in the process of learning by helping learners to develop skills of finding information, but the learners would also seek help or information from each other. The teacher here takes the role of facilitator either as a participant in the group or as an outsider almost in a consultant's role (Johnson, Johnson and Holubec, 1993; Njabili, 1995; Brandes and Ginnis, 1996; Imasiku, 1999).

Group work is a substantial pillar of learner-centred education, with balancing efficiencies and inefficiencies in preparation and presentation, but there is no question of its potential contribution to more effective learning and more confident learners and teachers if it can be done well. It promotes logical and rational thinking, leading to systematic solutions. Responsibilities are shared among members of the group and, as such, students become accountable for their own learning and for each others' learning (Schmuck and Slavin, 1985; Njabili, 1995; Kagan, 1995; Brandes and Ginnis, 1996; Engelbrecht, 2000).

Interactive Method (The discussion technique)

The interactive method is a purposeful and deliberate encouragement of interaction either between the teacher and the learners or among the learners. The mode of delivery includes: Question and answer form as found in group and class discussions; feedback questions and answer form as found in tutorials; and seminar method through verbal and audio-visual means. The interactive method enhances and improves thinking skills and oral expression for learners. It is useful for teaching Physical Science lessons where discussion of events and observation in case of experiments is likely to enhance and foster understanding (Schmuck and Slavin, 1985; Kagan, 1995; Njabili, 1995; Cullingford, 1998; Slavin, 1994). Some interactive methods namely, Class discussion method and Question and Answer method will be briefly discussed below:

- **Class discussion**

Class discussion can take place before, during and after the lesson. A class discussion can also be triggered spontaneously at any time by the teacher or the learner by means of stimulating questions. Class discussion requires small classes and encourages student involvement, but may be time-consuming. It also encourages learners' participation and is effective for developing in learners higher cognitive skills, such as evaluation. Further, a lot of space and resources are necessary in the teaching/learning process (Johnson et al., 1993; Kagan, 1995; Njabili, 1995; Dunne and Wragg, 1997; Engelbrecht, 2000).

- **Question and Answer**

The question and answer method is also applicable in the teaching of Physical Science. This method can be used to link what was learnt previously to new information. It can also be used to direct the attention of students to what is being presented as well as arousing interest, thereby stimulating learning (Slavin, 1994).

The question and answer method of teaching could be learner to learner and could also be teacher to learner but whichever the case, the aim is to foster active learner participation, encourage interaction and socialization between the teacher and the learners. Questioning monitors learners' learning and encourages their involvement but may cause anxiety for some (Wragg, 1996; Chipeta, 1997; Barnes, 1999; Engelbrecht, 2000).

Project work

This is a technique where learners can be given a topic to do some studies on. The topic can be chosen by the teacher or by the learners depending on the school subject or the desired topic. In the case of Physical Science, a teacher can get learners to choose a topic and then do an investigation or research using different resources. This approach is learner-centred as learners would use their own initiative to gather and analyze information and demonstrate their writing skills in the learning process through the project they would do (Katz and Chard, 1990; Henry, 1995; Kagan, 1995; Imasiku, 1999)

Project work could be individualized for learners and it could also be in form of a group project, but whichever the case, the aim of the two is the same; to foster better learning and encourage active learner participation. It requires careful planning and evaluation techniques. It is very useful at higher levels of learning (Johnson et al., 1993; Chipeta, 1997; Dunne and Wragg 1997; Engelbrecht, 2000).

Practical and Experimentation

Practical and Experimentation is a very important component of coursework and practical work in Physical Science (Kagan, 1995; Dunne and Wragg, 1997). For example, in Experimental Techniques, learners are required to use the appropriate apparatus for the measurement of time, temperature, mass and volume under the guidance of their teacher. Students can do the work individually or as a group. The purpose of an experimentation method of teaching is usually to help the learners to make a discovery, test a theory or demonstrate a known fact by undertaking a scientific procedure. This method of teaching can help learners to try out new things practically thus, gaining a better insight into the learning content (Katz and Chard, 1990; Johnson et al., 1993).

The use of teaching aids such as the microscope, magnifying glass, thermometers, etc, is obviously an indispensable part of an experimentation technique in Physical Science. Usually an experimentation method of teaching involves demonstration; therefore it is sometimes very difficult to distinguish between a practical and experimentation method. The important thing to bear in mind about the experimentation technique is that it is aimed at helping learners to experience the content of the lesson by themselves (Kagan, 1995, Katz and Chard, 1990; Engelbrecht, 2000).

Problem solving and Discovery learning

Problem-solving and Discovery learning are learner-centred approaches. They involve a process whereby learners are actively involved, either as individuals or in groups finding and determining the answer to questions or solving problems. These methods are effective in promoting the understanding of content as well as the thinking processes involved in learning. Creative and critical thinking skills can be developed in finding a solution to a problem or discovering the answer by oneself. In this case, the teacher acts as a facilitator. The problem solving method has a high motivational value for learners, since school or subject knowledge can be applied to real-life problems (Kagan, 1995; Glasgow, 1996; Dunne and Wragg, 1997).

These methods also help learners to think about their thinking to solve problems. Thus, they help to develop the learner's thinking skills, enhance depth of understanding; increase their comprehension level and retention of the learning content because learners are required to work with everyday problems and to apply theory to practice (Njabili, 1995; Brandes and Ginnis, 1996; Slavin, 1994).

Peer tutoring

Learners learn much about life and school subjects informally from their friends and peers. By realizing this, the teacher can use this trend to improve the formal teaching. Peer tutoring requires careful planning and monitoring by the teacher. It utilizes differences in student expertise and encourages student involvement. It also fosters cooperation among learners which in turn enhances better performance (Kagan, 1995; Culliford, 1998; Engelbrecht, 2000). Peer tutoring is effective in producing positive academic and social outcomes for learners.

Debate

Debate requires that learners, mostly two or four, prepare themselves for a topic and present the opposite view. Afterwards, the class discussion/learning discussion can follow. This method increases learners' motivation. Language use and the vocabulary of learners are indirectly improved. It also leads to the development of the self-image of the learner and the focus in the teaching shifts from the teacher to the learner (Kagan, 1995; Dunne and Wragg, 1997).

Simulation

Using the Simulation approach, learners confront a scaled-down approximation of a real-life situation. Simulation allows realistic practice without the expense or the risks otherwise involved. The simulation may involve participant dialogue, manipulation of materials and equipment, or interaction with a computer. Laboratory experiments in Physical Science are popular topics for simulations (Jones, 1985; Bruce and Marsha, 1996).

Simulations provide practice in specific skills. They produce anxiety for some learners but help learners to actively participate in the teaching and learning process. Simulations can be used for acquisition of information, improvement of new processes, and identification of alternatives in decision-making. Simulations can also build positive values and attitudes in learners (Jones, 1985; Bruce and Marsha, 1996).

Field trips

The logical extension of bringing part of the world into the classroom is taking the class into the “real” world. Field trips are useful not only because they give learners firsthand knowledge and enable them to see how a number of skills, processes, etc, blend into a whole, but also because they can be used to provide students with cultural experiences available in no other way. Field trips should be directly related to an ongoing unit of work. Learner involvement during each step of planning a field trip helps generate interest and makes the trips more worthwhile (Dunne and Wragg, 1997; McCombs and Whistler, 1997; Engelbrecht, 2000).

Accordingly, Physical Science teachers are required to use different learner-centred methods of teaching in their classrooms to meet the demands of the syllabus and to address the needs of the different capabilities of the individual learners.

Training of teachers in implementing LCE

Many writers including Slabbert and Greenhalgh (1999) and Imasiku (1999) have stated that the teacher education curriculum has been learner-centred both in approach and in content. Despite this, Slabbert and Greenhalgh (1999) found that student teachers still had some confusion over what LCE really means and that student teachers

still preferred the safety of teacher-centred education. In addition, many authors including Van Graan (1998), Slabbert and Greenhalgh (1999), and Imasiku (1999) indicated that, for the benefit of serving teachers, learner-centred approach became a major component of in-service training in the form of workshops at regional and national levels, cluster workshops within regions, subject meetings and classroom demonstrations. Nevertheless, the adoption of learner-centred methods of teaching by the teachers has been slow (Van Graan, 1998).

The discussion document “Learner-Centred Education in the Namibian Context” by NIED (2003) arrived at a similar conclusion to that of Slabbert and Greenhalgh (1999) and Imasiku (1999). It pointed out that there have been different understandings of what is meant by LCE and how to put it into practice by the stakeholders of education. This document further noted that the factor of inconsistency is a major constraint in the implementation of LCE in Namibia.

Implementation of LCE

Mpofu (2002) found out that although Home Economics teachers held positive attitudes towards LCE and its methods, they still used the lecture method (which is teacher-centred) and only used the learner-centred methods of teaching to give them the opportunity to have control over the teaching and learning process. They mostly used the methods of group work, discussions and question and answer while, other learner-centred methods were seldomly used.

The above observation seem to suggest that some teachers are somehow positive about following a learner-centred approach to teaching but often lack knowledge and as many authors (Van Graan, 1998; Slabbert and Greenhalgh, 1999; Mpofu, 2002; NIED, 2003) rightly pointed out, in some cases teachers lack motivation to change existing

classroom practices. This lack of motivation could be as a result of the perception by teachers that the change to the use of LCE was mandated from the top.

Problems encountered in the implementation of LCE

A study by O'Sullivan (2004) of a 3-year in-service training (INSET) programme on 145 unqualified primary school teachers in Namibia indicated that learner-centred approaches were not implemented in the classrooms because of deficiencies in teachers' professional capacity i.e. inadequate knowledge at the time of the study, limited resources, cultural factors and learner background. O'Sullivan further stated that efforts within the INSET programme to support teachers' implementation of learner-centred approaches led to re-conceptualization. O'Sullivan concluded that the effectiveness of developing teachers' skill and enhancing learning in learners lead to the adaptive approach which means that whichever methods that bring about learning which may not necessarily be learner-centred in nature were highlighted i.e. teachers should examine the realities within which they work and experiment with strategies that seek to achieve students' learning within the limitations of these realities.

Overcoming the problems encountered in the implementation of LCE

Barends (2004) found that the lack of training and confidence by teachers were some of the obstacles in the implementation of LCE. He concluded that one of the ways of addressing the problem was to involve teachers in the strategic work and planning in the school and through that, they will in turn gain more power over their own development and classroom practices. He further suggested that teachers need more training in order to understand the difference between LCE and teacher-centred education (TCE). Cook (1994) is of the opinion that LCE practices can only improve in

the classroom when teachers are ready to embrace the reform and that teachers' reflection can help foster their understanding and practice of learner-centred methods of teaching in the classroom. Cook concluded that teachers' reflection can improve their learner-centred approach to teaching.

On the other hand Chaka (1998) asserted that in order for Namibian LCE to be effective, practical teacher education should include the stakeholders so that the education system will become whole and holistic focusing on all the educational and developmental needs of the learner. In addition, NIED (2003:9) stated that "if the learners are taught in a way which builds on what they already know and have experienced, and relates new knowledge to the reality around them, they (learners) will learn that learning in school can be meaningful".

Conclusions from literature review

From the literature reviewed, it is evident that many teachers are familiar with the term "learner-centred" but are slow in adopting the learner-centred methods of teaching in the classroom (Van Graan, 1998; NIED, 2003). Also, the various researches revealed that the discourse of learning has not changed widely, despite the inclusion of the LCE in the teacher training curriculum and the MOE's effort in offering INSET programmes for on-the-job training of teachers on how to teach using the various learner-centred methods of teaching (Slabbert and Greenhalgh, 1999; Imasiku, 1999).

The problem to be addressed by the Ministry of Education and other stakeholders is why many teachers are still not able to put learner-centred approaches into practice in the school settings. NIED (2003) concluded that if the quality of education is to improve throughout the system, changes needed to be made by all the stakeholders through greater understanding, consistency and implementation of the approach of LCE. It is quite obvious that in the first decade of independence in Namibia, universal access to education has been achieved; in the next decade it must be ensured that all children receive the best quality education possible.

From the above discussion, there are definite advantages of learner-centred methods of teaching as it improves significantly the understanding of the learners. Better understanding by the learners will lead to better quality of students graduating from our secondary schools (MEC, 1993; MBESC, 1999; NIED, 2003).

It is evident that the findings from different studies that have been done are that teachers are slow in adopting learner-centred methods of teaching. In light of this, there was need to undertake a study to find out more about what really was the present situation about the knowledge and practice of learner-centred methods of teaching by Physical Science teachers in selected Namibian secondary schools in the Omusati Region and what could be done to improve the status quo.

Summary

The various researches done on LCE and learner-centred methods of teaching were described in this chapter. The next chapter deals with the methodology of data collection from the respondents.

CHAPTER THREE

METHODOLOGY

Introduction

As pointed out in the previous chapters, the purpose of this study was to investigate the knowledge and practice of learner-centred methods of teaching by Physical Science teachers in four Senior Secondary Schools in the Omusati Education Region. This chapter is concerned with describing the methods and procedures that were used to gather information from the participants. To this end, this chapter describes the research design, population, sample and the sampling approach that were used, the instruments, data collection procedure and data analysis.

Research Design

The qualitative research design was used in this study. The qualitative research relies on the collection of non-numerical data such as words and pictures. The qualitative research design was appropriate for this study because the data collected were in form of words and behaviours as they occur in their natural environments (Gay, 1998; Johnson and Christensen, 2004; Shank, 2006). Specifically, the case study was used for executing this study. The case study was appropriate for this study because it is an in-depth investigation of an individual, a group of individuals, a school, a community or institution (NIED, 2003). It allowed the researcher to learn as much as possible about the population or phenomenon under investigation and also helped the researcher to organize data for the purpose of reviewing the social reality in the classroom (Babbie, 1992; Shank, 2006). The case study approach also helped the researcher to address the research questions (Johnson and Christensen, 2004; Shank, 2006).

Population

The population of the study was made up of all the Physical Science teachers from all the Senior Secondary Schools in the Omusati Education Region. The characteristics of the participants were twofold: they were all teaching Physical Science at grade 11 and 12 levels in Senior Secondary Schools, and were all working in the Omusati Education Region.

Sample and Sampling procedure

Purposive sampling was used in the study. Purposive sampling is a nonprobability sampling technique in which the researcher solicits persons with specific characteristics to participate in a research study (Patton, 1990; 2002; Johnson and Christensen, 2004). For example, people may be chosen for a study because they all hold a particular position or they possess a particular attribute that is relevant to the study. Teaching Physical Science as a subject in a Senior Secondary School and working in the Omusati Education Region were relevant attributes of the participants in this study.

Accordingly, purposive sampling was used to select the research participants who were nine Physical Science teachers from four Senior Secondary Schools in the Omusati Education Region because these participants were rich in information and also offered useful manifestations of the issue of interest. Sampling here was aimed at gaining insight about the issue of interest (Patton, 1990; Johnson and Christensen, 2004).

Research instruments

The instruments that were used for data collection from the respondents included the Observation schedule, Questionnaire and Interview. To ensure the validity of the

instruments, the instruments were given to the supervisor who made changes and corrections which were included in the final instruments.

Questionnaire

The questionnaire is a self-report data collection instrument that each research participant fills out as part of a research study (Patton, 1990; Hatch, 2002; Johnson and Christensen, 2004; Shank, 2006). The reason for using the questionnaire was to help the researcher elicit the knowledge and experiences of Physical Science teachers about the issue of interest (Johnson and Christensen, 2004). The questionnaire was made up of both closed and open ended questions. The questions in Part I of the questionnaire focused on the participants' knowledge of LCE, learner-centred methods of teaching and the type of training they had received on LCE. Part II consisted of questions about their practice of learner-centred methods of teaching Physical Science in the classroom and the classroom environment, problems encountered and how they solved these problems. Part III dealt with the views and attitudes of Physical Science teachers toward learner-centred teaching method and Part IV consisted of demographic questions.

Observation Schedule

Observation is defined as the watching of behavioural patterns of people in certain situations to obtain information about the phenomenon of interest (Patton, 1990, 2002; Johnson and Christensen, 2004; Shank, 2006). The observational method was the primary technique for collecting data on nonverbal behaviour.

An observation schedule containing and defining precisely what were to be observed was used to observe and record the practices of the participants. The use of observation provided the researcher with the opportunity to be a non-participant observer.

According to Patton (1990:199), “to understand a world, you must become part of that world while at the same time remaining separate, a part of and apart from.”

Using an observation checklist, the researcher observed the Physical Science teachers teach in the classroom, taking note of what was seen and heard in the classroom, how the teacher practiced learner-centred methods of teaching in the natural setting of the classroom, the type of interactions between the teacher and the learners and amongst the learners, and how participative the learners were during the lesson. Also, non verbal communication, tone, gestures, concrete details and verbatim comments were included (Sowell, 2001; Shank, 2006). Three lessons per each Physical Science teachers were observed which made up a total of 27 lessons observed by the researcher. Out of the 27 lessons observed, 15 lessons were observed in the Physical Science laboratory while 12 lessons were observed in the regular classroom. In addition, the duration of each lesson was 45mins and the Physical Science teachers were not forewarned of the exact day of the researcher’s visit to do the classroom observations in their particular lessons.

Interview

An interview is a data-collection method in which an interviewer asks questions of an interviewee (Patton, 1990; Johnson and Christensen, 2004; Shank, 2006). The type of interview that was used in this study was a standardized open-ended interview which contained a set of structured open-ended questions that was asked in a specific order and exact words. The questions were written out, and the interviewer read the questions exactly as written and in the same order to all interviewees (Patton, 1990; Sowell, 2001; Johnson and Christensen, 2004). This was to ensure that all participants answered the same set of questions in the same order to avoid interviewer’s bias. The standardized open-ended interview was the third and last instrument used by the

researcher after the classroom observations and the administration of the questionnaire were done in that order.

Data collection procedure

Before engaging in classroom observation, interviewing and administering of the questionnaires to the participants, the researcher requested permission from the Director of Education in the Omusati Region as well as the principals of the schools that were included in the study. At each school, the researcher explained the purpose of the study to the participants. The researcher also explained to the participants how the classroom observation and interview would be done. The researcher then distributed the questionnaires personally to all the nine teachers who were in the sample schools for the study. The researcher gave the participants one week to complete the questionnaire, after which the researcher went back to collect the questionnaires personally.

An observation of the Physical Science teachers teaching was then conducted. Three lessons per teacher were observed making up a total of 27 lessons. The classroom observations enabled the researcher to observe how teachers used the learner-centred methods of teaching in the teaching-learning process. Being able to directly observe the teachers' practices of the learner-centred methods of teaching Physical Science clearly reflected what happened in the classrooms of the participants. Finally, the standardized open-ended interview was conducted on the day that was convenient for the participants.

Data analysis procedure

The data that were collected through the questionnaires, observation schedules and interviews were adequately presented and analyzed. The data analysis required reduction and interpretation of the amount of information collected to certain codes and categories which were then interpreted (Sowell, 2001; Johnson and Christensen, 2004). Analyzing the data also required searching for relationships and patterns until a holistic picture emerged. Descriptive statistics were also used to present and analyze the data. In addition, frequency tables were used for data presentation and analysis.

Summary

The methodology and procedures that was used to collect the data from the respondents were described in this chapter. The next chapter describes the data presentation, analysis and interpretation.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

Introduction

In this chapter the data that were collected are presented, analyzed and discussed according to the objectives that guided the study. The results are presented under each question given in chapter one and also mostly through the use of tables.

In order to ensure that the information collected on the knowledge and practices of learner-centred methods of teaching by Physical Science teachers in the Omusati Education Region under investigation, was reliable and consistent, the researcher apart from using the questionnaire and standardized open-ended interview to obtain data, also undertook classroom observations of the respondents.

Personal attributes of the respondents

A total of four schools that offer Physical Science in the Omusati Education Region participated in the study. Almost an equal number of male and female Physical Science teachers participated in the research study. Precisely nine teachers comprising of four female teachers and five male teachers from four Senior Secondary Schools participated in the study.

Respondents were asked to indicate their ages. Table 1 provides their responses.

Table 1: Ages of the respondents (N = 9)

Ages	No. of respondents	Percent (%)
21 -25	1	11
26 – 30	5	56
31 – 35	1	11

36 – 40	0	0
41 – 45	2	22
Total	9	100

The age range of the respondents was between 21 and 45 as shown in Table 1. The majority (78%) of the respondents were below 35 years while the remaining 22% of the respondents were 41 years and above. The age of the teachers may have a bearing on the teacher's use of learner-centred methods of teaching. The Presidential Commission on Education, Culture and Training (1999) pointed out that some older teachers did not have adequate skills to use learner-centred methods of teaching, due to the fact that they were trained at a time when teacher-centred methods of teaching were the order of the day.

By virtue of their ages, the majority of the respondents were trained as teachers after Independence in 1990 which means that they were trained after the learner-centred curriculum or paradigm had been introduced into the teacher training colleges (Van Graan, 1998). Hence, they were expected to be able to use the learner-centred method of teaching in the classroom.

Highest professional qualifications

Respondents were asked to indicate their highest professional qualification. Table 2 shows their responses.

Table 2: Highest professional qualification of the respondents (N = 9)

Highest professional qualification	No. of respondents	Percent (%)
Diploma in education/ BETD	5	56
Further Diploma in Education	1	11
Bachelor of Education	2	22
Bachelor of Science	1	11
Total	9	100

Table 2 shows that the respondents had different qualifications. The majority (5 out of 9) had Diploma in Education. Traditionally, holders of the diploma qualifications are qualified teachers. However, only two of the respondents had Bachelor of Education qualification while one respondent had a further diploma qualification. One respondent had a Bachelor of Science qualification which is an academic qualification and not a professional teacher qualification.

The level of education of an individual may have a bearing on the knowledge and practice of that person in the learner-centred methods of teaching. The majority (8) of the respondents were qualified teachers. Therefore, by virtue of their qualifications, these individuals were expected to have knowledge of the learner-centred approach to teaching because the learner-centred approach to teaching had been incorporated into the curriculum of the teacher training colleges (Van Graan, 1998). For the benefit of serving teachers, who might not have been exposed to the learner-centred approach to teaching during their training, the learner-centred approach to teaching had become a major component of in-service training in the form of workshops at regional and national levels, cluster workshops within regions, subject meetings and classroom demonstrations (Van Graan, 1998) were held. In light of this, teachers who have been exposed to learner-centred methods of teaching should have knowledge of the learner-centred methods of teaching and should be able to use these methods in their classrooms.

Teaching experience

Respondents were asked to indicate their teaching experience. Table 3 shows their responses.

Table 3: Teaching experiences of the respondents (N = 9)

Number of years	No. of respondents	Percent (%)
0 – 5	5	56
6 – 10	2	22

11 – 15	1	11
16 – 20	1	11
Total	9	100

As shown in Table 3, the majority of the respondents (78%) had been in the teaching service for at most 10 years while 22% had been teaching for between 11 and 20 years.

The number of years in the teaching service could have a bearing on one's knowledge and practices of learner-centred methods of teaching. The majority (78%) of the respondents had been teaching for at least 10 years. This implies that these individuals were more or less newly trained teachers (in independent Namibia) who could have been exposed to learner-centred methods of teaching. Hence, they were expected to be able to use the learner-centred method of teaching in the classroom. However, the Presidential Commission on Education, Culture and Training (1999) pointed out that in some schools, the newly trained teachers were discouraged from using learner-centred methods of teaching by their principals who did not understand the learner-centred approach to teaching.

On the other hand, only two or 22% of the respondents had been teaching for between 11 and 20 years. This implies that these individuals could have been trained as teachers before independence in 1990 when teacher-centred methods of teaching were the order of the day. The Presidential Commission on Education, Culture and Training (1999) observed that some of the older teachers did not have adequate skills to use the learner-centred methods of teaching.

Training in Physical Science

When asked if they had Physical Science training, all but one of the nine respondents indicated that they had been trained to teach Physical Science. The way Physical Science as a subject is designed, requires teachers to use a wide variety of teaching methods in their classrooms, such as group work, discussions, discovery, question and

answer, project work, independent inquiry, problem-solving, practical and experimentation, field trips, and simulations. These methods ensure active participation of learners in the teaching and learning process.

The Physical Science teachers’ knowledge of the learner-centred approaches to teaching

When asked whether they used different methods of teaching in their classrooms, all nine respondents answered in the affirmative both in the questionnaire and in the standardized open-ended interview. This is not surprising because the MBEC (1998) clearly stated that teachers should use a variety of teaching methods to promote active learner participation in the teaching and learning process.

However, only four respondents confirmed the existence of a government regulation requiring the use of a variety of learning methods (Table 4). As shown in Table 4, this reason was, together with “school requirement” and “to avoid boredom”, the least cited reasons for using different learning methods.

Table 4: Reasons for using different teaching methods by the respondents (N=9)

Reasons	No. of respondents	No. of respondents as % of the sample
It is a subject requirement	5	56
It is a requirement of the MOE	4	44
It is a school requirement	1	11
For improving the learning and teaching process	8	89
For motivating and stimulating learning	9	100
To avoid boredom for learners	1	11

The most important reasons cited by the respondents were “to motivate and stimulate learning, “to improve the teaching and learning process”, and “subject requirement”,

cited by nine (9), eight (8) and five (5), of the respondents respectively. These findings generally concur with what Bruce and Marsha (1996), Brandes and Ginnis (1996), Glasgow (1996), Chipeta, (1997), Dunne and Wragg (1997), Cullingford (1998), and Barnes (1999) said about the use of different methods of teaching. Among other things, these authors pointed out that the use of different learner-centred methods of teaching enabled the teacher to motivate, stimulate and improve the teaching and learning process. Further analysis of the answers pertaining to the question at hand revealed that the majority of the respondents (7) cited some of the reasons, while only one cited all the possible reasons for using different methods of teaching. Given that the respondents were asked to cite all the possible reasons that apply to them, it could be construed that not all the reasons applied to the seven that chose only some of them.

Also, when asked to explain the terms “LCE and learner-centred methods of teaching in their own words, the majority of the respondents gave a concise definition and explanation of what the terms meant. They explained LCE to mean a paradigm that places the student at the centre of education whereby placing the responsibility for learning on the student while the teacher assumes the responsibility of facilitating the students’ learning. They also indicated learner-centred methods of teaching to mean the various ways of teaching learners such that learners fully become part of the teaching and learning process by being actively involved by learning through doing. For example, discussion method, problem solving method, group work method, just to mention a few.

Training on LCE and learner-centred methods of teaching

Pre-service Teacher training on LCE

From the questionnaire and standardized open-ended interviews, the respondents were asked to indicate the type of training they had received as a student teacher on LCE. All but one of the nine respondents indicated that they had received training on LCE

through courses like general teaching methodology, curriculum and instructional studies and teaching methods of Physical Science as student teachers in addition to the teaching practice experience they had during their training at the teacher training colleges.

Post-service Teacher training

Respondents were asked to indicate the type of training they had received on LCE since becoming professional teachers. Table 5 gives their responses.

Table 5: Post-service Teacher training on LCE received by the respondents (N=9)

Post-service training on LCE	No. of respondents	No. of respondents as % of the sample
Through further study (MASTEP)	2	22
Through Workshops	5	56
No Training	3	33

The majority 56% of the respondents had received some form of training through workshops on LCE since qualifying as professional teachers, while 22% of the respondents in addition to the training received through workshops also had received training during the course of taking part in the MASTEP programme. However, three of the respondents had not received any additional training on LCE or learner-centred teaching approaches since qualifying as professional teachers. This might be due to the fact that these three individuals were amongst the respondents with less than five years teaching experiences.

It is not surprising that more than half of the respondents had received training on LCE and learner-centred methods of teaching since they became teachers. These findings clearly concur with what Van Graan (1998) said about the effort made to train on-the-

job teachers on how to teach using the learner-centred approach, especially those teachers who were trained before independence in 1990.

Respondents' practices of the learner-centred approach to teaching Physical Science

Table 6 summarizes how often the respondents used each learner-centred aspect.

Table 6: Respondents' responses on how often they used each learner-centred aspect (N=9)

Learner-centred aspect	Always		Seldom		Never		Total	
	F	%	F	%	F	%	F	%
Allow learners to choose learning activities	0	0	4	44	5	56	9	100
Encourage peer tutoring	4	44	5	56	0	0	9	100
Allow students to work in groups	3	33	6	67	0	0	9	100
Involve learners in the organization of the learning activities	1	11	6	67	2	22	9	100
Allow learners to move freely in the classroom	1	11	3	33	5	56	9	100
Give students the opportunity to evaluate their own work	3	33	6	67	0	0	9	100
Allow learners to teach each other	3	33	6	67	0	0	9	100

Key: F = Frequency

Table 6 shows that four respondents seldom allowed their learners to choose learning activities, while the majority (5) never allowed learners to choose learning activities. This finding suggests that the Physical Science teachers did not usually involve learners in the choice of the learning activities at any stage in their teaching. This finding is contrary to what Glasgow (1996), MBESC (1999), Van Harmelen (1999), NIED (2003) and Barends (2004) said about LCE “as being an approach to teaching and learning that involves democracy and active participation of the learners in the teaching and learning

process". Among other things, the authors pointed out that using the learner-centred approach also meant that the teachers put the needs of the learners at the centre of what they did in the classroom, rather than the learner being made to fit whatever needs the teacher had decided upon. Further, the authors asserted that learners should have a voice in the selection and organization of learning activities. They indicated that permitting learners to choose and organize the learning activities promotes attentiveness and co-operation during the teaching/learning process.

The majority (5) of the respondents rarely encouraged peer tutoring, while four respondents always used peer tutoring in their teaching as shown in Table 6. This finding seems to suggest that the Physical Science teachers sometimes used peer tutoring in their teaching. Although, four respondents indicated that they always used peer tutoring in their classroom, the observation checklist seems to indicate otherwise based on the direct observations by the researcher of the teachers teaching in the classroom. It was observed that the majority (7) of the respondents did not usually use peer tutoring in their classrooms (see Table 7). This finding is contrary to what Kagan (1995) and Cullingford (1998) observed about peer tutoring as a source of motivation for the learners and should be part of teaching.

Further, Table 6 shows that three respondents always allowed students to work in groups, while the rest (6) seldom allowed their students to work in groups. The three respondents who always used group work in their teaching were probably placing too much emphasis on students working together. It could be construed from this finding that these teachers did not provide opportunities for students to work individually. This finding is contrary to what the MBEC (1998) said about organizing students in the teaching and learning process. The MBEC (1998) said that teachers should vary the organization of the class according to the task being given. Students should be given tasks that promote individual work, working in pairs, working in small groups or

working together as a class. Therefore, always allowing students to work in group does not foster variety in instruction provision.

On the other hand, the six respondents who rarely allowed their students to work in groups were probably placing too much emphasis on individual work. This could imply that the majority of these Physical Science teachers sometimes allowed their students to work in groups. This finding is generally contrary to the findings of Mpofu (2002) and Van Graan (1998) who reported that teachers usually allowed learners to work in groups during the teaching and learning process which fostered interaction and cooperation amongst learners. The Physical Science subject being an interactive and practical subject requires a lot of interaction between the learner and lesson contents hence, the need for learners to sometimes be allowed to work in groups in order to interact, socialize and learn from each other. The responses of the respondents were in line with the researcher's observation of their teaching. Most of the respondents rarely used the group-work method during their classroom teaching; rather much emphasis was placed on individualized work (see Table 7).

In addition, Table 6 shows that one of the respondents always involved learners in the organization of the learning activities, while the majority (6) indicated that they rarely involved learners in the organization of the learning activities and two respondents never involved learners in the organization of the learning activities. It could be construed from this finding that these Physical Science teachers did not provide opportunities for learners to be involved in the organization of the learning activities. This finding is contrary to what Glasgow (1996), Brandes and Ginnis (1996), McCombs and Whistler (1997) and Barends (2004) said, that learners should have a voice in the selection and organization of learning activities. Allowing learners to choose learning activities provides opportunities for the students to be active participants in the teaching process.

Again one respondent always allowed learners to move freely in the classroom, three rarely allowed free movement of students in class and the other five respondents never allowed students to move freely in the classroom. The practice of allowing students to move freely in the classroom is a hallmark of learner-centred methods of teaching (McCombs and Whistler, 1997). It reflects and reinforces both values and practices of democracy, whereby learners take responsibility for their own learning. In a classroom where learner-centred methods of teaching are used, learners have the freedom to move freely in the classroom. On the basis of these findings, it would seem that the Physical Science teachers never allowed learners to move freely in the classroom. It could therefore, be concluded that the Physical Science teachers never practiced one of the main features of the learner-centred methods of teaching. However, the large number of learners in Namibian classrooms could be responsible for the non-movement or free movement of the learners in the class.

Further, it can be seen from Table 6 that three respondents always provided opportunities for their students to evaluate their own work, while the rest (6) rarely allowed the students to evaluate their own work. Given the standing requirement for teachers to evaluate their students' work, it would appear that the use of "always" in this case does not in any way prevent the teacher's evaluation of the students' work. It can be concluded from these findings that Physical Science teachers sometimes involved students in the evaluation of their own work.

Finally, three respondents indicated that they always allowed learners to teach one another, while the majority (6) indicated that they rarely allowed the learners to teach one another. It could be concluded from these findings that Physical Science teachers sometimes allowed learners to teach one other. These findings are in agreement with what Chipeta (1997) and McComb and Whistler (1997) said about learners teaching one another. They noted that the working together of learners is a valuable asset in teaching, as it promoted co-operative work habits, a sense of competence and elevated self-esteem among learners.

Nonetheless, the overall picture that emerges is that, to a certain extent, the Physical Science teachers did not practice some learner-centred methods in their teaching except those learner-centred methods of teaching that gave them control over the teaching and learning process. This was confirmed by the observation of the lessons (see Table 7).

Table 7: A checklist of respondents' learner-centred practices (N = 27)

Learner-centred practice	Very satisfactory		Satisfactory		Not used at all		Total	
	F	%	F	%	F	%	F	%
Learners are encouraged to work in groups	3	11	1	4	23	85	27	100
The learners are allowed to move freely in the classroom	5	18	1	4	21	78	27	100
Learners are given a chance to ask question	24	89	2	7	1	4	27	100
Learners are free to ask questions	21	78	5	18	1	4	27	100
The teachers responds to the learners' questions	21	78	5	18	1	4	27	100
Students are given the opportunity to respond to other students' contributions	11	41	11	41	5	18	27	100
The teacher encourages all students to participate	11	41	9	33	7	26	27	100
The teacher encourages peer tutoring	2	7	0	0	25	93	27	100
The teacher allows students	2	7	1	4	24	89	27	100

to teach each other									
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Key: F = Frequency

As shown in Table 7, the observations revealed that most of the respondents (85%) did not encourage students to work in groups but rather placed more emphasis on individualized work. Most of the respondents (78%) did not also allow their learners to move freely in the classroom.

Almost all the respondents (96%) gave learners a chance to ask questions. Table 7 also shows that students were free to ask questions and almost all the Physical Science teachers responded to the student's questions. Most of the respondents (82% and 74% respectively) gave the students the opportunity to respond to other students' contribution and encouraged learners to participate in the learning activities.

Further, observations showed that two teachers encouraged peer tutoring while seven did not. Finally, the observations revealed that most teachers did not allow students to teach one another.

From the respondents' answers to the questionnaire and the observations it became evident that, to an extent, the Physical Science teachers did not practice some learner-centred methods in their teaching. They rarely involved learners in the selection and organization of the learning activities, they did not encourage peer tutoring, they rarely allowed learners to work in groups, they rarely gave opportunities for learners to evaluate their own work, they rarely allowed students to teach one another in their classroom and they never allowed learners to move freely in their classroom.

Methods of teaching used by respondents

From a list of 10 different methods of teaching, the respondents were asked to indicate the methods they actually used in their teaching. Table 8 shows the methods of teaching that the respondents used in their teaching from the questionnaire.

Table 8: Methods of teaching used by respondents from the questionnaire (N = 9)

Teaching method	No. of respondents	No. of respondents as % of the sample
Group work method	8	89
Discussion method	9	100
Question and Answer method	8	89
Project work method	3	33
Independent inquiry method	6	67
Discovery method	7	78
Debate	0	0
Field trip	4	44
Simulations	2	22
Lecture method	5	56

As can be seen from Table 8, the discussion method was the most widely used method, cited by all nine respondents. The group work method and the question and answer method shared the second position in terms of frequency of use, cited by eight respondents apiece. Next came the discovery method in the third position, cited by seven respondents. The independent inquiry was in the fourth position cited by six respondents. The lecture method was in the fifth position cited by five respondents. The field trip method was in the sixth position, cited by four respondents. Then came the project work method and the simulations method in the seventh and eighth positions respectively, cited by three and two respondents respectively. The debate method was not used at all by any of the respondents.

By and large, the responses from the standardized open-ended interview were in agreement with some of the responses given from the questionnaire by the respondents as shown in Table 9.

Table 9: Methods of teaching used by respondents from the standardized open-ended interview (N = 9)

Teaching method	No. of respondents	No. of respondents as % of the sample
Group work method	8	89
Discussion method	9	100
Question and Answer method	9	100
Project work method	4	44
Independent inquiry method	8	89
Discovery method	5	56
Debate	0	0
Field trip	4	44
Simulations	2	22
Lecture method	8	89

As can be seen from Table 9, the question and answer method and the discussion method shared the first position as the most widely used method, as indicated by all nine respondents. The group work method, independent inquiry method and the lecture method shared the second position, as indicated by eight respondents apiece. Unlike in the questionnaire where the lecture method was cited by only five respondents as the method of teaching they normally used in the classroom, eight teachers cited the lecture method in the interviews. Further, there was an increase in the number of respondents from six respondents to eight respondents that indicated that they used the independent inquiry method as can be seen from Table 8 for the questionnaire and Table 9 for the standardized open-ended interview. In addition, seven respondents indicated they used the discovery method of teaching as can be seen in Table 8, but the result from Table 9 indicated otherwise showing only five respondents used the discovery method in the classroom.

From Tables 8 and 9, it would appear that the commonly used methods of teaching by the respondents are the question and answer method, discussion method, group work method, independent inquiry method, discovery method and the lecture method.

Nevertheless lesson observations were contrary to the respondents' answer to the questionnaire and the standardized open-ended interview, as can be seen in Tables 8, 9

and 10. This could be as a result of the researcher's presence during the teaching process by the Physical Science teachers.

Table 10: A checklist of methods of teaching that respondents used (N =27)

Teaching method	No. of times the respondents used it	No. of times the respondents used it as % of the sample
Group work method	2	7
Discussion method	5	19
Question and Answer method	22	82
Project work method	0	0
Independent inquiry method	13	48
Discovery method	0	0
Debate	0	0
Field trip	0	0
Simulations	0	0
Lecture method	19	70

As shown in Table 10, the observations of the Physical Science teachers revealed that the question and answer method was used by most of the respondents in their teaching (22 times out of the 27 lessons observed). The lecture method and the independent inquiry method were used 19 times and 13 times respectively. The discussion method and group work method were used five and two times respectively, while the project work method, discovery method, field trip method, simulations and debate method were never used at all out of the 27 lessons observed. The results from the classroom observations is not the same as the results from the questionnaire and the standardized open-ended interview as previously pointed out from Tables 8 and 9.

The results show that the three most frequently used methods of teaching by these Physical Science teachers are question and answer method, independent inquiry method, and the lecture method. The two least commonly used methods of teaching were the group work method and the discussion method. These findings confirm what

Good and Brophy (1997) said about the use of the lecture method. They pointed out that despite much research suggesting better alternatives, classrooms still appear to be dominated by teacher-centred methods of teaching. Teachers preferred teacher-centred methods of teaching because these give them control of the teaching and learning process.

It is worth noting that the lecture method, which for all intents and purposes is a teacher-centred method of teaching, was used by all the respondents. It is also worth noting that while the Physical Science teachers used some of the learner-centred methods of teaching, they preferred those learner-centred methods that gave the teacher the opportunity to play a dominating role in the teaching and learning process. These methods included the question and answer method, the discussion method, the group work (though rarely used) and the independent inquiry method. This result probably accounts for the observed findings whereby teachers used the lecture method and some learner-centred methods of teaching.

Tables 8 and 9 also show that very few respondents used teaching methods such as the field trip, project work, and simulations and none used the debate method. In addition, Table 10 shows that the discovery methods, field trip method, debate method, simulations and project work methods were not used by all the respondents. Chipeta (1997) observed that traditionally, these methods of teaching were viewed as some form of play, hence their limited use. This is not surprising, as Chipeta (1997) observed, the use of simulations and debate have to be monitored properly, otherwise these methods may present some artificiality of situations that can allow students to discount the value of learning. Further, Chipeta (1997) pointed out that if not properly monitored, these methods can deteriorate into play.

The findings from Table 10 could also mean that the respondents appear not to be familiar with the various learner-centred methods of teaching. Van Graan (1998) undertook a study of teachers who were considered to be using learner-centred methods

of teaching in Namibia. She found that the teachers seemed to be positive about following a learner-centred approach to teaching but often lacked knowledge, a deeper understanding of what the learner-centred approach constitute, the skills and techniques to apply it in the classroom situations.

Comparing the findings from the questionnaire (Table 8) and the standardized open-ended interview (Table 9) show little or no difference in their learner-centred practices but the results of the classroom observations (Table 10) of the respondents strongly suggest that the Physical Science teachers most frequently used the lecture method which is a teacher-centred method of teaching.

The respondents were asked to indicate how often they used different learner-centred methods of teaching. Table 11 summarizes their responses.

Table 11: Respondents' responses to how often they used different learner-centred methods of teaching from the questionnaire (N = 9)

Methods of teaching	Always		Seldom		Never		Total	
	F	%	F	%	F	%	F	%
Group work method	4	44	4	44	1	11	9	99
Discussion method	6	67	3	33	0	0	9	100
Question and answer method	7	78	2	22	0	0	9	100
Project work method	0	0	6	67	3	33	9	100
Independent inquiry method	6	67	3	33	0	0	9	100
Discovery method	3	33	5	56	1	11	9	100
Debate	0	0	2	22	7	78	9	100
Field trips	0	0	6	67	3	33	9	100
Simulations	0	0	2	22	7	78	9	100
Lecture method	3	33	4	44	2	22	9	99

Key: F = Frequency

Table 11 shows that four respondents always used the group work method in their teaching, while four respondents rarely used the group work method and only one

respondent never used the group work method at all. The majority (6) of the respondents always used the discussion method in their classrooms, while the rest (3) rarely used this method. Again, the majority (7) of the respondents always used the question and answer method in their classrooms, while two respondents rarely used it. In addition, six respondents always used the independent inquiry method while three respondents rarely used it.

It is evident from these findings that the Physical Science teachers used the question and answer method, independent inquiry method, discussion method and group work method at various stages in their teaching more often than the other methods.

The majority (6) of the respondents rarely used the project work method, while the rest never used this method of teaching. Also, six respondents rarely used the field trip method for teaching their learners, while three respondents never used it. These results seem to suggest that the Physical Science teachers hardly used project work method and field trip method in their teaching. This is quite surprising, given that the Physical Science syllabus requires students to do some practical and/or experiments during the course of the year. What is even more surprising is that, three of the respondents indicated that they never used project work in their teaching.

Again, two respondents rarely used the debate method, while seven respondents never used it in their teaching and the same result was obtained for the simulation method. These results seem to suggest that the Physical Science teachers never used the simulation and debate methods. This could be due to the fact that the teachers did not know how to organize a Physical Science lesson using the debate method. As indicated by the Physical Science teachers (See Table 15), the debate method is usually perceived as a teaching method that is mainly appropriate for language subjects. And it could also be that the Physical Sciences Teachers lacked the necessary resources needed to be used to organize a simulated science lesson.

Further, Table 11 shows that three respondents always used the discovery method of teaching, five seldom used it and only one respondent never used the discovery method. These results seem to suggest that the respondents occasionally used the discovery method in their teaching.

Finally, three respondents indicated that they always used the lecture method; four of the respondents indicated that they rarely used the lecture method while only two respondents indicated that they never used the lecture method. These results seem to suggest that the respondents sometimes used the lecture method in their Physical Science classrooms but these findings are quite contrary to the observations of the respondents' teaching (see Table 10) which seems to suggest that the respondents usually used the lecture method in most of their teaching. It could be that the respondents realized that indicating that they used the lecture method all the time contravene the new policy of learner-centred approach that was adopted by the MOE since independence and it could also be that the respondents were more comfortable with the lecture method whereby they had more control of the teaching and learning process. These findings confirm what Good and Brophy (1997) said about the use of lecture method. They pointed out that despite much research suggesting better alternatives, classrooms still appear to be dominated by teacher-centred methods of teaching.

It could be concluded from the findings in Table 11 that the Physical Science teachers used different methods of teaching at various stages in their teaching.

Methods of teaching frequently used by the Physical Science teachers

From the questionnaire, the respondents were asked to indicate the three methods of teaching that they frequently used in their teaching. In addition, they were asked to state the reasons for frequently using those methods. Table 12 provides their responses.

Table 12: Methods of teaching that respondents used frequently in their teaching and the reasons for the frequent use, from the questionnaire (N = 9)

Methods of teaching	Reasons for frequent use	F	Percent (%)
Question and Answer method	a) Helps to elicit information and gives feed- back to the teacher about what learners know and do not know.	2	22
	b) Helps to motivate learners to participate	1	11
	c) To stimulate the thinking skills of learners.	2	22
	d) To test understanding and for evaluation purposes.	2	22
Discovery method	a) Gives learners the opportunity to think widely, thus not limiting the thinking skill of learners.	1	11
	b) Usually useful in experiments to help learners find out the reasons for certain facts on a topic.	2	22
Group work method	a) Gives learners the chance to learn from each other thus encouraging peer tutoring.	2	22
	b) Helps to create good rapport among learners thus promoting socialization amongst them.	2	22
	c) Gets learners to become more involved in the teaching and learning process.	2	22
Discussion method	a) Helps learners and teachers to share ideas	1	11
		2	22

	b) For cross-fertilization of ideas amongst learners.	1	11
	c) To give learners the chance to express their opinion on a related subject matter.		
	d) To promote the communication skills of learners.	1	11
Lecture method	a) Helps the teacher to emphasize key terms to all the learners at the same time.	2	22
	b) Helps the teacher to cover a lot of content in a short lesson time i.e. saves the limited lesson time that is available.	2	22
	c) Helps the teacher to explain abstract concepts to learners.	1	11
Independent inquiry method	a) Learners' individual work is easy to evaluate through this method.	1	11
	b) Helps learners to master their work on their own.	1	11

Key: F = Frequency

Six methods of teaching were identified by the respondents however, four methods of teaching were frequently used by the respondents (Table 12). The question and answer method, cited by seven respondents was the most frequently used method. The reasons for the frequent use of this method were; it helps to elicit information and gives feedback to the teacher about what learners know and do not know; it helps to stimulate the thinking skills of learners; It can be used to test learners' understanding and for evaluation purposes. As shown in Table 12, these reasons were each cited by two respondents except for one respondent who indicated that the reason for using the question and answer method was because it helped to motivate learners to participate in the teaching and learning process.

The second most frequently used method cited by six respondents, was the group-work method. The reasons for the frequent use of this method were; it gives learners the chance to learn from each other thus encouraging peer tutoring; it helps to create good rapport among learners thus promoting socialization amongst them; it helps learners to become more involved in the teaching and learning process. As shown in Table 12 these reasons were each cited by two respondents.

The two other methods of teaching, lecture method and discussion method, were each cited by five respondents. Of the five that chose the lecture method, two said they frequently used this method because it helps the teacher to emphasize key terms to all the learners at the same time. Another two of the respondents frequently used this method because it helps the teacher to cover a lot of content in a short lesson time i.e. saves the limited lesson time that is available. And one respondent said he used the lecture method because it helps him to explain abstract concepts to learners.

With respect to the discussion method, the reasons for the frequent use of this method were; "It helps learners and teachers to share ideas"; "it helps the teacher to give learners the chance to express their opinion on a related subject matter"; "it helps to

promote the communication skills of learners”. As shown in Table 12, each reason was cited by one respondent each. The two other respondents who also indicated that they frequently used the discussion method indicated their reason to be; “for cross-fertilization of ideas amongst learners”.

From the above findings, it can be concluded that the Physical Science teachers frequently used different learner-centred methods of teaching for various reasons. Nevertheless, the findings indicated yet again that the respondents preferred to use methods of teaching that gave them the opportunity to have control over the teaching and learning process.

From the standardized open-ended interviews, the respondents were again asked to indicate which three methods of teaching they used frequently and to state the reasons for frequently using those methods.

Table 13: Methods of teaching that respondents used frequently in their teaching and the reasons for the frequent use from the standardized open-ended interview (N = 9)

Methods of teaching	Reasons for frequent use	F	Percent (%)
Question and Answer method	a) To give feedback to the teacher about what learners know and do not know.	2	22
	b) To assess learners' understanding	2	22
	c) To elicit learner's prior knowledge	2	22
Group work method	a) To help students learn from each other.	2	22
	b) It encourages cross-fertilization of ideas amongst learners.	1	11
	c) Leads to socialization amongst learners.	2	22
	d) Helps develop learners' interactive skills.	1	11
Lecture method	a) To help the teacher to cover much lesson content faster i.e. it saves time.	3	33
	e) b) Used by the teacher to tackle difficult and abstract topics.	2	22
	f) c) In the absence of learning resources, this method is quite effective.	2	22
	g)		
Discussion method	a) To help learners to share ideas with one another thereby aiding the recall of lesson content.	2	22
	b) It helps the introvert learners to open up thereby helping them develop a better	1	11

	rapport with other learners. c) It encourages learners to fully participate in the teaching and learning process.	1	11
Individual inquiry method	d) a) To assess individual learner's knowledge.	2	22
	b) Helps to teach learners how to work on their own.	1	11
Discovery method	a) Helps learners to find out the reasons for certain facts on a topic.	1	11

Key: F= Frequency

By and large, the findings from the standardized open-ended interviews are similar to the findings from the questionnaires. The results from Table 13 clearly indicated that the Physical Science teachers used a variety of teaching methods at various stages in their classrooms but the most frequently used teaching methods by these Physical Science teachers were the question and answer method (66%), the group work method (66%), the lecture method (77%) and the discussion method (44%).

It is worth noting once again, that the lecture method (a teacher-centred method of teaching) was mentioned as one of the most frequently used methods of teaching. Again, these interview findings confirm what Good and Brophy (1997) said about the use of teacher-centred methods of teaching. They pointed out that despite much research suggesting that learner-centred methods of teaching are better than teacher-centred methods of teaching, classrooms still appear to be dominated by teacher-centred methods of teaching.

However, it should be noted that the major reasons given for the frequent use of certain methods of teaching suggest that the respondents valued participation of their students in the learning process. Reasons such as "to stimulate the thinking skills of learners", "to motivate learners to participate", "to get learners more involved in the teaching/learning process", and "to give feedback to teachers about what learners know and do not know" are consistent with the practices of the learner-centred approach to teaching. These findings seem to point to the fact that the Physical Science teachers

have made significant strides towards the use of learner-centred methods of teaching in their classrooms. It is important to note that despite making significant strides towards the use of learner-centred methods of teaching, the Physical Science teachers used the lecture method in their classrooms.

From the questionnaire and standardized open-ended interview, the respondents were asked to indicate how the learners responded to the most frequently used methods in the classrooms. The responses to the most frequently used methods in the Physical Science classroom were the same in both the questionnaire and the standardized open-ended interview as shown in Table 14.

Table 14: Learners’ responses to the most frequently used methods of teaching by the respondents from the questionnaire and the standardized open-ended interview (N = 9)

Method of teaching	Learners’ responses	F	Percent (%)
Question and Answer method	a) Active participation and positive response from learners.	3	33
	b) Good and positive responses are received depending on learners’ understanding of the topic/lesson.	2	22
	c) The learners’ responses were sometimes positive and sometimes negative because of individual differences and abilities.	1	11
Group work method	a) Some learners are shy and do not like sharing ideas but the majority of the learners participated fully in the teaching and learning process.	3	33
	b) Most learners enjoy it because they		

	are able to move freely, make noise, socialize and actively participate.	2	22
	c) Responses were usually positive and help learners score better marks.	1	11
Lecture method	h) a) Most learners are inactive and do not participate and the lesson is very boring.	4	44
	i) b) Some learners do not even ask question when they do not understand.	1	11
	j) c) Positive response but some learners do not participate nor concentrate during the lesson.	1	11
	k) d) Some learners enjoy it because they do not want to be involved in the lesson; hence they enjoy taking notes and love being 'fed' the content.	1	11
Discussion method	a) Full participation and learners enjoy this method.	1	11
	b) Few learners participate.	1	11
	c) Some learners who are not good at expressing themselves do not participate and natural introverts also shy away from participating in the lesson.	1	11
Individual inquiry method	f) a) Most learners participate while some learners copy others.	1	11
	g) b) Positive response and all learners participate.	1	11
Discovery method	h) a) Some learners participate while others are passive.	1	11

As indicated by the respondents, Table 14 shows the responses of their learners to the various methods of teaching in the classroom. Six respondents noted the responses of their learners to the question and answer method. Two respondents indicated that the learners gave both positive and negative responses depending on their understanding and knowledge of the topic at hand. Three of the respondents also indicated that learners were usually active and fully involved during the use of this method, while one respondent indicated that the learners' positive or negative response was usually as a result of individual differences and abilities. These results seem to suggest that the learners were usually active during the use of the question and answer method.

Further, five respondents indicated the responses of their learners to the group work method. Two respondents noted that the learners enjoyed this method because it gave them (learners) the freedom to move around, make noise and socialize with other learners. One respondent indicated that learners were usually positive and it helped the 'not so bright' learners to score better marks by hiding under the bright learners in their groups. Also, three of the respondents indicated that some learners were natural introverts (or shy) hence did not usually like sharing ideas with other learners. These findings seem to suggest that group work method helps learners to take responsibility for their own learning. These findings are consistent with Schmuck and Slavin (1995), Njabili (1995), Kagan (1995), and Brandes & Ginnis (1996), assertions that responsibilities were shared among members of the groups and as such students became accountable for their own learning and for each others' learning. They noted that the working together of learners was a valuable asset in teaching, as it promoted co-operative work habits, a sense of competence and elevated self-esteem among learners.

In addition, three respondents indicated that although most learners participated when the discussion method was used, some natural introverts and some learners who had problems expressing themselves well especially in spoken English language somehow hesitated and were usually reluctant to be fully involved during the lesson.

Finally, seven respondents noted their learners' responses to the lecture method. One respondent each indicated the learners' response to be; "some learners do not even ask question when they do not understand", "learners give positive response but some learners do not participate nor concentrate during the teaching and learning process" and "some learners enjoy the lecture method because they (learners) do not want to be involved in the teaching and learning process since they enjoy taking notes and being spoon-fed". Four respondents however, indicated that their learners' responses to the lecture method were negative because the learners were inactive, did not participate and that lesson taught using the lecture method were quite boring to the learners.

As indicated by the respondents, these findings seem to suggest that generally learners' responses to the lecture method was usually negative though it made learners to sit quietly and placed the teacher in control of the teaching and learning process. In addition, much learning did not take place with the use of the lecture method because most learners were inactive during the teaching and learning process since the teacher did most of the talking (see Table 14).

From the questionnaire the respondents were asked to indicate three methods of teaching that they rarely used in their teaching. In addition, they were asked to state the reasons for the seldom use of those methods. Table 15 provides their responses.

Table 15: Methods of teaching that respondents rarely used in their teaching and the reasons for rarely using them from the questionnaire (N = 9)

Method of teaching	Reasons for rare use	F	Percent (%)
Role-playing	a) Topics in Physical Science are difficult to role-play.	1	11

Field trips	a) Very costly to undertake.	2	22
	b) Waste time and time consuming.	3	33
	c) Very difficult to organize.	1	11
	d) Places to visit by learners are limited.	1	11
Lecture method	d) a) Learners do not grasp easily through this method.	1	11
	m) b) Sometimes time-consuming when the lesson is not practical.	2	22
Project work	a) Lack of resources in the laboratory	2	22
	b) Takes time to complete work given to learners.	2	22
Discussion method	i) a) Very time consuming.	3	33
Question and Answer method	a) May lead to “spoon feeding” learners.	1	11
Independent inquiry method	a) Weak learners may not get help from peers.	1	11
	b) As a result of the differences in learners’ abilities, lesson content is not covered fast.	1	11
Debate	a) It is usually best for language subjects and only very few topics in the syllabus can be taught with this method hence it is very limiting.	1	11
Discovery method	a) Very costly and requires more lesson time.	1	11
Group work	a) It is time-consuming.	1	11

Key: F = Frequency

Ten methods of teaching were rarely used by the respondents as indicated by the respondents (Table 15). Field trip was cited by seven respondents as one of the most rarely used methods. Two respondents rarely used this method because they found it to be very costly to undertake in teaching Physical Science. Three respondents rarely used it because it is time-consuming and simply wasted valuable lesson time, one rarely used it because it is quite difficult to organize, and another indicated that places for learners to visit for field trips to learn Physical Science were few and limited (Table 15).

Further, the other least used method of teaching was the project work method cited by four respondents. Two explained their seldom use of the method to be because of lack of resources in the school laboratory and the other two said they seldom used this method because it took too long for learners to complete the work given to them.

Another method of teaching that the respondents used rarely was the discussion method cited by three respondents stating the same reason for their seldom use of this method. They all indicated that the discussion method was very time consuming in the Physical Science classrooms.

Further, the lecture method was also one of the rarely used methods of teaching as cited by three respondents. One respondent indicated that he seldom used the lecture method because learners did not grasp easily through this method and the remaining two respondents indicated that they seldom used the lecture method because it was sometimes very time-consuming especially if the lesson was not a practical lesson.

The independent inquiry method was another rarely used method of teaching as indicated by two respondents. One respondent indicated that he rarely used the independent inquiry method because weak learners might not get help from their peers and the other indicated that her reason for rarely using this method was because as a result of the difference in learners' abilities, the lesson content was not covered fast because this method required individual attention be given to all the learners.

The other five methods of teaching that were rarely used were the role-playing method, the question and answer method, the debate method, the discovery method and the group work method each cited by one respondent. The respondent who cited the role-playing method said that his reason for the seldom use of this method was because topics in Physical Science were difficult to role-play in the classroom. The respondent who cited the question and answer method indicated that she rarely used this method because it might lead to 'spoon-feeding' the learners the answers to the questions asked. The respondent who cited the debate method indicated that he rarely used this

method because it was only very few topics in the syllabus that could be taught with this method hence it was very limiting. The respondent who cited the discovery method indicated that he rarely used this method because it was very costly because it involved more lesson resources and it required more lesson time. And finally, the respondent who cited the group work method indicated that she rarely used this method because it was equally time-consuming.

The variation in the above responses points to the fact that there are methods of teaching that are rarely used by the Physical Science teachers for a variety of reasons. The most common reason given by the majority (8) of the respondents was ‘time-consuming’. A closer analysis of these reasons shows that most of them gave freedom to the learners and thus less control to the teacher. This suggests that teachers rarely used those methods that constituted a loss of control in the teaching and learning process. These findings re-affirm the earlier finding that teachers preferred those methods in which they retained control in the teaching/learning process.

Problems faced by the Physical Science teachers in the implementation of the learner-centred methods of teaching and the solutions.

From the questionnaire, respondents were asked to indicate three problems they faced in their implementation of the learner-centred methods of teaching. In addition, they were asked to indicate the solutions they had found to the identified problems. Table 16 provides their responses.

Table 16: Problems the respondents faced in their implementation of the learner-centred method of teaching and the solutions from the questionnaire (N = 9)

Problems	Solutions	F	Percent (%)
Time constraint	a) Monitor learners' work and encourage them to finish faster.	1	11
	b) Try to manage time more effectively.	2	22
	c) Organize extra lessons to cover the syllabus.	1	11
	d) Give limited time to learners to do their class work.	1	11
Lack of self-confidence amongst learners	a) Motivate and encourage the passive learners to participate.	4	44
	b) Move around the classroom and point at shy learners to participate; and also give individual task to learners.	1	11
	c) Give shy learners leadership positions such as group leaders.	1	11
	d) Identify the capable learners to do activities in the class.	1	11
Lack of resources	a) Improvise and try to give practical examples for learners to visualize.	1	11
	b) Do more demonstrations for learners to see.	1	11
English language barrier	a) Correct learners' use of English without embarrassing them and help learners with proper pronunciation.	1	11
	b) Simplify the lesson by using simple words learners can easily understand.	1	11
Learners' lack of knowledge and reluctance to participate	a) Give learners more responsibility in doing more reading.	1	11
	b) Review the teaching method and make it more interesting.	2	22
	c) Give learners the copy of the syllabus to		

	enable them to familiarize themselves with the aims and objectives of the curriculum.	1	11
LCE is better and more effective for brilliant learners	a) Give remedial lessons to the not so clever learners.	1	11
	b) Use the teacher-centred approach which is the only option for the not so clever learners.	1	11
It encourages lots of noise	a) Monitor learners' activities and tell them to keep quiet.	1	11

Key: F = Frequency

Also, from the standardized open-ended interview, the respondents were asked to indicate the problems they faced in their implementation of the learner-centred methods of teaching. In addition, they were asked to indicate the solutions they had found to the identified problems. Table 17 provides their responses.

Table 17: Problems the respondents faced in their implementation of the learner-centred method of teaching and the solutions from the standardized open-ended interview (N = 9)

Problems	Solutions	F	Percent (%)
Time constraint	a) Minimize the number of science experiments done and do more demonstration.	1	11
	b) Teachers try to be time-conscious and be as fast as possible.	2	22
	c) Organize remedial lesson to finish the lesson.	1	11
	d) Give limited time to learners to do their class work.	1	11
	e) Monitor learners' work and encourage them to finish faster.	1	11
Classroom space is too small for group work	a) Make the group of learners to be bigger to help accommodate all the learners.	1	11
English language barrier	a) Correct learners' use of English without embarrassing them and help learners with proper pronunciation.	3	33
	b) Simplify the lesson by using simple words learners can easily understand.	3	33
	c) Give learners a chance to discuss in small groups to help them to open up before	1	11

	discussing in front of the whole class. d) Discourage learners from making fun of each other when they make mistakes when speaking English telling them English language is not their mother tongue.	1	11
Lack of resources and appropriate teaching aids	a) The school fund is used to buy affordable resources e.g. test-tube. b) Sometimes resources are borrowed from other schools. c) Teachers try to do more explaining of concepts, show pictures, give handouts and use the computer. d) Improvise by using available materials to do mostly demonstrations.	1 1 1 1	11 11 11 11
Lack of self-confidence amongst learners	a) Motivate and encourage the learners to participate even when they give wrong answers. b) Discourage teasing of learners by their peers. c) Move around the classroom and point at shy learners to participate; give individual task to learners. d) Organize remedial work for learners.	2 2 2 1	22 22 22 11
LCE is better and more effective for brilliant learners	a) Use the teacher-centred approach which is the only option for the not so clever learners. b) Give remedial learners to the not so clever learners.	1 1	11 11
It encourages lots of noise	a) Monitor learners during the teaching and learning process.	1	11

Key: F = Frequency

Looking at Tables 16 and 17 above, similar problems were indicated by the respondents except for problems like “learners’ lack of knowledge and reluctance to participate and “classroom space being too small for group work as indicated by three respondents and one respondent respectively (see Tables 16 and 17 respectively).

The results (i.e. problems and solutions) as indicated by the respondents in Tables 16 and 17 seem to suggest that the major problems these Physical Science teachers were

facing in the implementation of the learner-centred methods of teaching were English language barrier, lack of learners' self-confidence, time-constraints, lack of adequate resources, and learners' lack of knowledge and reluctance to participate as cited by eight, seven, six, four and three respondents respectively (see Table 17).

However, as indicated by the Physical Science teachers, for example, some of the solutions to the problem of time-constraint was to organize remedial and extra lessons for learners to cover the syllabus and to manage time more effectively; the solution to the problem of lack of resources and appropriate teaching aids was to improvise and use available materials to do mostly demonstrations; the solution to the problem of noise made by learners during the teaching and learning process was for the teacher to move around the classroom to monitor learners' activities; for the problem of English language barrier, the teachers indicated that they simplified the lesson by using simple words learners could understand and gave leadership positions to shy learners, etc. These results seem to point to the fact that the Physical Science teachers have made significant strides towards the use of the learner-centred methods of teaching in their classrooms. It is important to note that despite making significant strides towards the use of the learner-centred methods of teaching, a handful (2) of the respondents indicated that LCE was better and more effective for clever learners and the solution they offered for the 'not-so-clever' learners was to use the teacher-centred method of teaching.

Physical Science teachers' attitudes towards the learner-centred methods of teaching.

To determine the respondents' attitudes towards the learner-centred approach to teaching, respondents were asked to react to a set of seven learner-centred practices. Their reactions are shown in Table 18.

Table 18: Respondents' attitudes towards selected learner-centred practices (N = 9)

Learner-centred practices	Agreed		Disagreed		Total	
	F	%	F	%	F	%
Learners should be allowed to move freely in class.	2	22	7	78	9	100
Learners should be allowed to choose learning activities.	4	44	5	56	9	100
Learners should be given the opportunity to evaluate their own work.	9	100	0	0	9	100
Learners should be allowed to work in groups.	9	100	0	0	9	100
Learners should be allowed to work individually.	8	89	1	11	9	100
Learners should be allowed to teach one another.	9	100	0	0	9	100
Learners should learn quietly.	4	44	5	56	9	100

Key: F = Frequency

In the case of three of the practices, all nine respondents were in agreement with the stated practice. The three learner-centred practices with which all the nine respondents were in agreement were; the learners should be given the opportunity to evaluate their own work, the learners should be allowed to work in groups and the learners should be allowed to teach one another. In addition, the majority (8) of the respondents were in agreement with the practice of allowing learners to work individually, while only one respondent disagreed with this learner-centred practice.

In respect of the two learner-centred practices, the reaction of the majority of the respondents was in the negative. Seven respondents believed that learners should not be allowed to move freely in the class, while five respondents believed that learners should not be allowed to choose the learning activities. Further, four respondents believed that learners should learn quietly while five believed that learners should not learn quietly. These findings confirm an earlier finding that the Physical Science teachers rarely allowed students to move freely in their classrooms (see Tables 6 and 7). This implies that teachers want their students to sit down quietly and pay attention to what they are told to do.

The overall picture that emerges from the above findings is that the majority (8) of the respondents had positive attitudes towards the involvement of students in the teaching and learning process. On the basis of these findings, it can be concluded that the Physical Science teachers have positive attitudes towards the learner-centred practices.

Availability of teaching and learning resources

Respondents were asked to indicate the availability of teaching and learning materials that were considered essential to the teaching and learning process in the Physical Science classroom. Table 19 provides their responses. An Observation checklist confirmed the respondents' answers.

Table 19: Availability of equipment and materials for teaching and learning (N=9)

Items	Adequate		Satisfactory		Inadequate		Total	
	F	%	F	%	F	%	F	%
Tables	4	44	5	56	0	0	9	100
Chairs	2	22	2	22	5	56	9	100
Textbooks	3	33	6	67	0	0	9	100
Reagents	3	33	4	44	2	22	9	100
Conical flask	3	33	4	44	2	22	9	100
Test tubes	3	33	4	44	2	22	9	100
Thermometer	3	33	4	44	2	22	9	100
Beakers	7	78	0	0	2	22	9	100
Litmus paper	7	78	0	0	2	22	9	100
Sodium chloride	7	78	0	0	2	22	9	100

Key: F= Frequency

The availability of materials and equipment has a bearing on the teaching and learning process. All nine respondents had adequate reading tables and Physics and Chemistry textbooks. Five of the respondents had inadequate chairs in their laboratory. The majority (7) of the respondents had beakers, litmus papers, reagents, conical flask, test-

tubes, thermometers and sodium chloride in their laboratory while two respondents each had inadequate beakers, litmus paper, reagents, conical flasks, test-tubes, thermometers and sodium chloride respectively in their laboratory.

It is worth noting that the two respondents that had inadequate scientific materials and resources in their laboratories were teaching in the same school. It is also important to note that though the majority of the respondents had adequate and satisfactory reading tables in their school laboratories, the majority (5) of the respondents as earlier mentioned had inadequate chairs (Table 19). This explains why many learner-centred methods were not used in the Physical Science classrooms. When learners have little or no chairs to sit on and be comfortable while learning.

These findings seem to suggest that the Physical Science teachers have the necessary resources (with the exception of chairs and laboratory materials in a certain school) to implement the learner-centred methods of teaching.

Summary

In this chapter, the collected data were analyzed and interpreted in accordance with the questions of the study. The major findings were that the Physical Science teachers have knowledge about the learner-centred methods of teaching, they used a variety of teaching methods at various stages in their teaching, the Physical Science teachers preferred the method of teaching that gave them control of the teaching and learning process and they held positive attitudes towards the use of the learner-centred methods of teaching. The lack of science equipment and appropriate teaching and learning aids, English language barrier amongst learners and the time consuming nature of lessons in a learner-centred way may be fostering the continued use and popularity of teacher-centred methods of teaching in the Physical Science classes.

The next chapter summarizes, draws conclusions and gives recommendations on the basis of the findings of this study.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

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

Summary

Prior to independence in March 1990, the Bantu Education was the order of the day and the teaching method was strictly teacher-centred (MEC, 1993, p 10). The curriculum that was offered then was designed to enable learners to read and write. For this reason, science subjects such as Physical Science were not part of the curriculum at lower grades. For example, before independence Physical Science was offered from Grade 10 to Grade 12 (Amukugo, 1993). Acquisition of basic skills of literacy, numeracy, gardening and practical skills of home management that would enable black children to take up specific jobs that white people had to offer, for example, being domestic workers was deemed sufficient (MEC, 1993; Amukugo, 1993).

The teacher-centred methods of teaching are considered to be inefficient and frustrating to most learners and certainly are not consistent with the philosophy of education for all (MEC, 1993: p.10). Therefore, in order to ensure equity, there was need to introduce totally different methods of teaching that focus on the learner being actively and fully involved in the learning process.

This study was therefore undertaken to find out the practice and knowledge that Physical Science teachers have on the learner-centred methods of teaching. The

research problem was identified on the basis of the fact that progress towards the adoption of learner-centred methods of teaching has been slow (Van Graan, 1998). Also, as indicated by Marope and Nooman (1995), learner-centred teaching implied different things to different teachers. The researcher felt that the results of the study would provide insight into the knowledge and practices of learner-centred methods of teaching by Physical Science teachers.

The following questions were addressed:

1. What is the Physical Science teachers' understanding of the concepts learner-centred education (LCE) and learner-centred methods of teaching?
2. What type of training have the Physical Science teachers received to facilitate the use of learner-centred methods of teaching in their classrooms?
3. How do Physical Science teachers implement learner-centred methods of teaching in the classroom?
4. What problems do Physical Science teachers face in the use of the learner-centred methods of teaching in the classroom?
5. How are the Physical Science teachers overcoming the problems preventing the effective use of the learner-centred methods of teaching?

The case study was used for executing the study. A total number of nine Physical Science teachers in four Senior Secondary Schools in the Omusati Education Region participated in the study. It was impossible and difficult for the researcher to include all the Physical Science teachers in all the Senior Secondary Schools in the Omusati Education Region because of the distance between one Senior Secondary to the other, the limited time available for the researcher to undertake this study and also because of financial constraints of the researcher. The questionnaire, observation schedules and standardized open-ended interviews were used to collect the data from the nine respondents.

Findings

The major findings of the study were that:

1. Physical Science teachers used a few of the learner-centred methods of teaching that motivated, stimulated and promoted active participation of learners in the teaching and learning process. These methods included the question and answer method, independent inquiry method and discussion method. Nevertheless, the Physical Science teachers preferred to use the learner-centred methods of teaching that gave them the opportunity to have control over the teaching and learning process. In addition, seven out of the nine participants (see Table 13) used the lecture method (which is a teacher-centred method of teaching) in their teaching. They indicated that the lecture method helped students to be able to understand what was being taught, it enabled the teacher to provide information when a new topic was introduced and learners benefited more when the teacher provided information.
2. The Physical Science teachers rarely used discovery method, project work, field trip and experimentation in their teaching. Simulations were not used at all. These methods of teaching were rarely used because most of them gave more freedom to the learners and thus less control to the teacher.
3. The Physical Science teachers faced certain problems in the implementation of the learner-centred methods of teaching in their classroom which sometimes prohibited them from using the various learner-centred methods in the Physical Science class. Problems such as, lack of self-confidence amongst learners, time constraint, lack of resources and appropriate teaching aids, English language barrier, learners' lack of knowledge and reluctance to participate and increased level of noise by learners.

4. The Physical Science teachers practiced few learner-centred aspects. They gave students the opportunities to ask questions, provided students with the opportunities to respond to other students' contributions, encouraged all students to participate in the teaching and learning process, allowed students to teach one another at various points in their teaching and they allowed learners to work individually mostly through classroom exercise. However, the Physical Science teachers did not practice some other learner-centred aspects for example, they did not involve learners in the evaluation of their own work, did not encourage learners to work in groups although the classroom arrangement was learner-centred in certain schools i.e. learners sat in groups, learners were not involved in the selection and organization of the learning activities, learners were not allowed to move freely in the classroom and peer tutoring was not encouraged.
5. The Physical Science teachers displayed knowledge of the various learner-centred methods of teaching but were skeptical about its sole use (without using the lecture method). The Physical Science teachers were of the opinion that the learner-centred methods of teaching alone was not enough for helping learners to attain success and the required standard in Physical Science because of various reasons like lack of self-confidence amongst learners to express themselves and fully participate in the teaching and learning process, English language barrier amongst learners, lack of resources like science equipment and appropriate teaching aids, learners' inadequate knowledge about most Physical Science topics and the fact that learner-centred methods of teaching are too time-consuming.
6. The level of qualification of some of the Physical Science teachers were also found to be inadequate for them to effectively teach Physical Science at grade 11 and 12 levels because the majority of the teachers had basic diplomas in education.

Conclusions

On the basis of the findings, it could be concluded that the Physical Science teachers used some of the learner-centred methods of teaching at various points in their teaching. They also mostly used the lecture method which is a teacher-centred method of teaching in their classrooms. These findings indicate that they preferred methods of teaching that gave them the opportunity to have control over the teaching/learning process.

Further, it can be concluded that the Physical Science teachers practiced some learner-centred aspects in their classrooms. These practices included encouraging students to ask questions, allowing students to respond to other students' contributions, the Physical Science teachers encouraged all learners to participate, the Physical Science teachers responded to learners' questions, the Physical Science teachers sometimes allowed the students to teach each other at some stage in the lesson and allowed students to work individually.

Finally, it can be concluded that although the Physical Science teachers understood what the learner-centred methods of teaching was all about they were yet to fully embrace the various learner-centred methods of teaching in their classrooms and were yet to incorporate all the learner-centred methods of teaching into their everyday teaching.

Recommendations

In view of these findings and conclusions, the following recommendations are made:

1. Physical Science teachers should use all the different learner-centred methods of teaching which include group work method, discussions, project work, question and answer method, independent inquiry method, peer tutoring, practical and

experimentation method, discovery method, field trips, project work and simulations to cater for individual learners' needs and to maximize learner participation in the teaching and learning process.

2. The Ministry of Education should provide the Physical Science teachers with enough resources like science equipment and teaching aids. This could encourage them to use various learner-centred methods of teaching.
3. The time allocated for teaching Physical Science needs to be increased from 45 minutes to 90 minutes in order to give the teachers ample time to organize the lesson especially practical lessons in a learner-centred way.
4. Further, research involving a larger number of Physical Science teachers from different schools throughout the country be carried out to check the validity and reliability of the findings of this study.

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APPENDICES

Appendix 1: Letter to the Regional Director, Omusati Educational Region.

Dept. of Mathematics, Science & Sport Education,
University of Namibia,
P. O. Box 13301, Windhoek.

The Regional Director (Omusati Region),
The Ministry of Education,
Private Bag 2020,
Ondangwa.

Dear Sir,

**RE: REQUEST FOR PERMISSION TO UNDERTAKE RESEARCH AT
NEGUMBO SENIOR SECONDARY SCHOOL, OKALONGO SECONDARY
SCHOOL, ASHIPALA SECONDARY SCHOOL AND NUYOMA SECONDARY
SCHOOL.**

I am studying for a Masters of Education degree at the University of Namibia. An important requirement of this programme is the research project. For my research project, I have chosen to investigate the knowledge and practice of learner-centred methods of teaching by Physical Science teachers in selected schools in the Omusati Education Region.

I therefore, kindly request permission to collect the necessary data using a questionnaire, from Physical Science teachers at the above mentioned schools. I have chosen these schools because they offer Physical Science as a subject.

The findings of this research might be helpful in informing the stakeholders of education about the everyday practice of learner-centred methods of teaching in the Physical Science classrooms, which might in-turn help improve the teaching/learning process for learners.

I shall send a summary of the findings to the schools that will participate in the study. Also, the findings of the intended study will be placed at the University of Namibia library for public use.

Thanking you in advance for your anticipated favourable response.

Yours faithfully,

Awe, G. A. (Ms)

Appendix 2: Letter to the Principals of Participating Schools

Dept. of Mathematics, Science & Sport Education,
University of Namibia,
P. O. Box 13301, Windhoek.

Dear Sir/Madam,

THE KNOWLEDGE AND PRACTICE OF LEARNER-CENTRED METHODS OF TEACHING BY PHYSICAL SCIENCE TEACHERS IN SELECTED SCHOOLS IN THE OMUSATI EDUCATION REGION.

I am studying for a Masters of Education degree at the University of Namibia. As part of the requirements for the Masters of Education degree, I am required to undertake research in the field of education. I have chosen to investigate the knowledge and practice of learner-centred methods of teaching by Physical Science teachers in selected schools in the Omusati Education Region.

For the findings of a study of this nature to be useful, honest views of concerned teachers are important. The researcher hopes that the results of the study will provide some insight into the current situation of Physical Science teaching and learning in Namibia. This information could be used by the Ministry of Education to improve the teaching and learning of the subject.

I therefore, kindly request permission to collect the necessary data using a questionnaire, an observation schedule and a standardized interview from Physical Science teachers at your school. I have chosen your school because you offer Physical Science as a subject.

I would like to assure you that the responses to this questionnaire will bear no name and will be confidentially treated.

I will be pleased to send you a summary of the study for your information and action if you so desire.

Thanking you in advance for your anticipated favourable response and co-operation.

Sincerely yours,

Awe, G. A. (Ms)

Appendix 3: Letter to the Physical Science teachers.

Dept. of Mathematics, Science & Sport Education,
University of Namibia,
P. O. Box 13301, Windhoek.

Dear Sir/Madam,

THE KNOWLEDGE AND PRACTICE OF LEARNER-CENTRED METHODS OF TEACHING BY PHYSICAL SCIENCE TEACHERS IN SELECTED SCHOOLS IN THE OMUSATI EDUCATION REGION.

I am studying for a Masters of Education degree at the University of Namibia. As part of the requirements for the Masters of Education degree, I am required to undertake research in the field of education. I have chosen to investigate the knowledge and practice of learner-centred methods of teaching by Physical Science teachers in selected schools in the Omusati Education Region.

For the findings of a study of this nature to be useful, honest views of concerned teachers are important. The researcher hopes that the results of the study will provide some insight into the current situation of Physical Science teaching and learning in Namibia. This information could be used by the Ministry of Education to improve the teaching and learning of the subject.

I would, therefore, be grateful if you could kindly take a few minutes of your time to complete this questionnaire. The enclosed instrument (questionnaire) is devised in such a manner to make it possible for one to obtain all necessary data while requiring a minimum of your time. This is mainly due to the fact that I have taken cognizance of the workload and the other commitments that you might have at the moment.

I would like to assure you that your answers to this questionnaire cannot be identified with you in any way and will be held in the strictest confidence. Please do not write your name on any part of the questionnaire.

I will be pleased to send you a summary of the study for your information and action if you so desire.

Thank you for your co-operation.

Sincerely yours,

Awe, G. A. (Ms)

Appendix 4: Questionnaire for the Physical Science teachers.

The Knowledge and Practice of Learner-centred Teaching methods by Physical Science teachers in the Omusati Education Region.

Directions for completing the questionnaire:

- a) Please follow the instructions and answer all questions as best as you can.
- b) Your answers to questions contained in this questionnaire will be treated confidentially. They will only be used for academic purposes.
- a) Do not write your name on the questionnaire.
- b) You are required to honestly and freely answer all the questions.
- e) Please note that there is neither right nor wrong answers to these questions. Just answer the questions according to your knowledge, understanding and experience.
- a) Thank you for your cooperation.

Part I

Tick (√) the appropriate answer

1. Do you use different methods of teaching in your classroom?

a) Yes ()

b) No ()

2. If the answer to question 1 is yes, what are your reasons for using different methods of teaching?

Tick (√) all the reasons that apply

a) It is a subject requirement ()

b) It is a requirement of the MOE ()

c) It is a school requirement ()

d) For improving the learning and teaching process ()

e) For motivating and stimulating learning ()

f) Other (please specify) _____

3. If the answer to question 1 is No, explain why

4. What is your understanding of the following terms: Learner-centred education (LCE) and learner-centred methods of teaching?

Learner-centred Education (LCE)	Learner-centred methods of teaching

5a. Specify the type of training you received on LCE during your pre-service teacher training programme (i.e. during your training as a student-teacher)

Pre-service teacher training programme
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5b. Specify the type of training you received on LCE during your post-service teacher training programme (i.e. after becoming a professional teacher)

Post-service teacher training programme

Part II

6. How often do you do each of the things listed below in your teaching?

Tick (✓) the appropriate answers

	Always	Seldom	Never
a) Allow learners to choose learning activities			
b) Encourage peer tutoring.			
c) Allow students to work in groups.			
d) Involve learners in the organization of the learning activities.			
e) Allow learners to move freely in the classroom.			
f) Give students the opportunity to evaluate their own work.			
g) Allow learners to teach each other.			

7. Which methods of teaching listed below do you use in your teaching?

Tick (✓) all that apply

- a) group work method ()
- b) discussion method ()
- c) question and answer method ()
- d) project work method ()
- e) independent inquiry method ()
- f) discovery method ()
- g) debate ()
- h) field trip ()
- i) simulations ()
- j) lecture method ()

8. Are there other methods of teaching not listed above in question 7 that you use in your teaching?

- a) Yes ()
- b) No ()

9. If the answer to question 8 is yes, please specify the methods.

10. How often do you use each methods mentioned in question 7? Tick (✓) the appropriate answer

Method of Teaching	Frequency of Use		
	ALWAYS	SELDOM	NEVER
Group work method			
Discussion method			
Question and answer method			
Project work method			
Independent work method			
Discovery method			
Debate			
Field trips			
Simulations			
Lecture method			
Others (please specify)			

11. List three methods of teaching that you use frequently in your teaching.

a) _____

b) _____

c) _____

12. For each of the methods of teaching listed in question 11, explain why you use each method frequently.

Method	Reasons for frequent use
a)	
b)	
c)	

13. How do learners respond to the methods listed in question 11 above?

Method	Learners' response
a)	
b)	
c)	

14. List 3 methods of teaching that you seldom use in your teaching

a)

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b) _____

c) _____

15. For each one of the methods of teaching listed in Question 14 explain why you use them seldomly.

Method	Reasons for seldom use
a)	
b)	
c)	

16. What problems do you face in the use of the learner-centred methods of teaching in your classroom and how do you solve the identified problems?

Problems	Solution
a.	a.
b.	b.
c.	c.

Part III

17. Indicate with a tick (✓) whether you agree or disagree with each of the following statements.

	Agree	Disagree
a) Learners should be allowed to move freely in class.		

b) Learners should be allowed to choose learning activities.		
c) Learners should be given the opportunity to evaluate their own work.		
d) Learners should be allowed to work in groups.		
e) Learners should be allowed to work individually.		
f) Learners should be allowed to teach one another.		
g) Learners should learn quietly		

Part IV

Tick (√) in the appropriate answer

18. Sex:

Female ()

Male ()

19. Age:

21 - 25 years ()

26 – 30 years ()

31 – 35 years ()

36 – 40 years ()

41 – 45 years ()

46 – 50 years ()

51 years and above ()

20. What is your highest professional qualification?

21. How long have you been in the teaching profession?

- a) 0 – 5 years ()
- b) 6 – 10 years ()
- c) 11 – 15 years ()
- d) 16 – 20 years ()
- e) 21 years and above ()

22. Did you take Physical Science as one of the subjects while training?

- a) Yes ()
- b) No ()

Thank you

Appendix 5: Observation Schedule.

An observation schedule for the Physical Science teachers' practice of the learner-centred methods of teaching.

1. Which of the following learner-centred methods of teaching in the table below does the teacher use in the teaching/learning process? (Rate each of the statements listed below)

	Very satisfactory	Satisfactory	Not used at all
a) Learners are encouraged to work in groups.			
b) The learners are allowed to move freely in the classroom.			
c) Learners are given the chance to ask questions.			
d) Learners are free to ask questions			
e) The teacher responds to the learners' questions.			
f) Learners are given the opportunity to respond to other students' contributions.			
g) The teacher encourages all students to participate in the learning activities.			
h) The teacher encourages peer tutoring.			
i) The teacher allows students to teach each other.			

2. Is the classroom environment conducive to learning?

Yes ()

No ()

3. Which of the following methods of teaching does the teacher use in the teaching/learning process?

a) Group work ()

b) Discussions ()

- c) Question and answer method ()
- d) Practical and experimentation ()
- e) Project work ()
- f) Problem solving ()
- g) Discovery learning ()
- h) Debating ()
- i) Others _____

4. Availability of teaching/learning equipment or items.

Item	Adequate	Satisfactory	Inadequate
Tables			
Chairs			
Textbooks			
Test tubes			
Conical flask			
Beaker			
Thermometer			
Sodium chloride			
Litmus paper			

5. What is the role of the teacher in the teaching/learning process?

- a) Facilitator ()
- b) Dominating ()
- c) Laissez-faire ()

6. Does the teacher use learner-centred methods of teaching?

- Yes ()
- No ()

End of Observation schedule

Appendix 6: Standardized Open-ended Interview

A standardized open-ended interview for the Physical Science teachers' practice of learner-centred methods of teaching

1. Do you use different teaching methods in your class?

a) Yes ()

b) No ()

2. If Yes, Why?

3. If No, Why?

4. Which methods of teaching listed below do you use in your teaching?
Tick (✓) all that apply

- k) group work method ()
- l) discussion method ()
- m) question and answer method ()
- n) project work method ()
- o) independent inquiry method ()
- p) discovery method ()
- q) debate ()
- r) field trip ()
- s) simulations ()
- t) lecture method ()

a. Which teaching methods do you frequently use in your teaching?

a) _____

b) _____

c) _____

6. For each of the methods of teaching listed in question 4, explain why you use each method frequently.

Method	Reasons for frequent use
a)	
b)	

c)	

7. How do learners respond to the methods listed in question 4 above?

Method	Learners' response
a)	
b)	
c)	

8. What problems do you face in the use of the learner-centred methods of teaching in your classroom and how do you solve the identified problems?

Problems	Solution
a.	a.
b.	b.
c.	c.

9. Have you received any training on LCE and/or on learner-centred methods of teaching before?

a) Yes ()

b) No ()

10a. Specify the type of training you received on LCE during your pre-service teacher training programme (i.e. during your training as a student-teacher).

Pre-service teacher training programme

10b. Specify the type of training you received on LCE during your post-service teacher training programme (i.e. after becoming a professional teacher).

Post-service teacher training programme

Thank you