TEACHERS' EXPERIENCES AND ROLES OF THE REVISED BIOLOGY CURRICULUM: A CASE OF SELECTED SECONDARY SCHOOLS IN OMPUNDJA CIRCUIT, OSHANA REGION, NAMIBIA

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ABSTRACT

The purpose of this study was to investigate the experiences and roles of Namibian teachers on the implementation of the Biology revised curriculum in the Ompundja circuit, Oshana Region. The study employed a qualitative – case study design where fifteen (15) Biology teachers from Ompundja circuit, in the Oshana Region were selected from the five (5) Secondary schools by means of the purposive sampling strategy and a semi-structured face-face interviews to collect the data that was analysed thematically. The study established that teachers experience inadequate resources, medium of instruction for Biology a challenge, inadequate time for content coverage as well as overcrowded classes. It was also unveiled that Biology Secondary school teachers are the major pillars of curriculum implementation. They are motivators of learners, learners' assessors, planners for the subject content, and developers of activities and teaching materials, creators of a positive learning environment as well as engagers of learners in extra-mural activities. In essence, they are agents of change and curriculum implementers. Against the above findings, it was recommended that, in order to motivate learners and raise their interest in Biology, schools should take part in awarding of the best teachers and learners to inspire them to learn Biology. Parents should be involved in an education system as educational stakeholders and implements policies that uplift the education system. Specifically, it recommends the Ministry of Education, Arts and Culture to revisit the criteria that were used to allocate teaching resources to schools so that the neediest schools are prioritized and the amount of funds to be in and in line with their needs in line with the teaching and implementation of the revised Biology curriculum among others.

Keywords: curriculum, implementation

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DEDICATION

This thesis is dedicated to my late mother, Akweenda Loide and my children Sindano, Iyaloo and Shishani for their great encouragement and support they gave me.

DECLARATION

I, Frostinia Tuyenikomwene Vatileni, hereby declare that this study is my own work and is a true reflection of my research and that this work or any part thereof has not been submitted for a degree at any other institution.

Frostinia T Vatileni

Signature:  Date: April 2024

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LIST OF ABBREVIATION /ACRONYMS

CAPS- Curriculum and Assessment Policy Statement

CBAM- Concerns Based Adoption Model

HOD-Head of Department

IC- Innovation Configurations

ICT- Information Communication Technology

INSET- In-service Education and Training

LoU- Levels of Use

MBEC- Ministry of Basic, Education and Culture

MoEAC- Ministry of Basic Education, Arts and culture

NIED-National Institute for Educational Development

PAAI- Plan of Action for Academic Improvement

PLCs- Professional learning communities

SADC- Southern African Development Community

SDP- School Development Plan

SoC- Stages of Concern

URE- University of Namibia's Research Ethics Committee

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CHAPTER 1: INTRODUCTION

1.1 Background of the study

Following the country's independence in 1990, the Government of the Republic of Namibia has placed and devoted considerable resources in education so as to improve the system and to meet the basic learning of all children. The desire of the people of Namibia, before the country's independence, were to provide an education that is accessible, efficient and of good quality, life-long learning and democratic participation in all spheres of education.

The curriculum has been developed to give direction to Basic Education towards the realisation of Namibia Vision 2030. It ensures continuity of the foundation principles of the Namibian education system described in Towards Education for all: A development brief for education, culture and training (Ministry of Education and Culture, 1993). Curriculum reform is a crucial aspect for every education system since we are living in a dynamic world. Skidmore and Carmichael (2013) state that if countries are not reforming their education system, they will be letting down the future generation of learners who will be competing in this dynamic world. Since 1990, both South Africa and Namibia took initiatives to reform part of their curriculum to produce learners who should be able to compete in the changing world (Emmanuel & Nondwe, 2014).

To achieve the goals, aims and competencies of education, the Ministry of Education, Arts and Culture has gone through the process of curriculum reform which introduced a standardized curriculum in the primary phase followed by the reform of secondary education. In the current stage, Namibia's formal education system comprises of four phases: Junior Primary Phase (Pre-Primary, Grades 1-3), Senior Primary Phase (Grades

4-7), Junior Secondary Phase (Grades 8 and 9) and Senior Secondary Phase (Grades 10-12), (Ministry of Education, Arts and Culture,(NIED) 2016).

According to Rogan and Grayson (2003) , initiatives by both governments and funding agencies are often too focused and limited in the development of curricula, while the details regarding the way in which the curricula will be implemented at school level are often neglected. First and foremost, it is important to note that for effective teaching and learning, those responsible for implementing the curriculum are teachers who are involved in classrooms, applying the curriculum daily.

Effective the implementation of the curriculum, therefore, is of great importance, especially to quality teaching and learning. It is essential that the curricula be dynamic and meet the changing needs of the era. According to this philosophy, it is important to keep with the changes of the curriculum (Hewitt, 2006). Factors, such as the fact that teachers may not be properly trained to implement the curriculum effectively, could impact the implementation negatively. Therefore, proper training and induction must be facilitated to build teachers' capacity in order to implement the revised curriculum effectively. This suggests that teachers need to be trained in such a way that they can even develop their own resource materials; this requires time for teachers to prepare and construct classroom resources.

For Aguilar (2020), he argue that the quantity and quality of the expected behavioural outcomes of the school learners are contingent on the successful implementation of the given education curriculum. It is also argued that production of quality and open-minded

learners can be realised only if the subject curriculum is effectively and justifiably articulated and implemented (Johnson, Bird, Fyffe & Yench, 2012).

The failure of the Namibian educational product to effectively compete with the learning products of other nations, particularly those of countries located in the Southern African Development Community (SADC) region, is one of the difficulties that the educational community in Namibia has to deal with (Ministry of Education, Arts and Culture, (The National Curriculum for Basic Education, NIED 2016). This was mostly due to the curriculum's low degree of difficulty, which did not adequately prepare Namibian learners for the rigours of university study, particularly if they were required to continue their educations outside of the country. This difficulty resulted in educational curriculum revisions in the year 2018, an initiative that resulted in the whole Namibian curriculum being rewritten, beginning with the primary level, and continuing through the secondary level.

Development in the field of natural science is one of the main driving forces behind the transformation of society and the world. Additionally, the natural sciences area of learning contributes to the foundation of a knowledge-based society by empowering learners with the scientific knowledge, skills and attitudes to formulate hypotheses and to investigate, observe, make deductions and understand the physical world in a rational, scientific way (Ministry of Education, Arts and Culture, (The National Curriculum for Basic Education, NIED 2016). According to Ministry of Education, Arts and Culture, (The National Curriculum for Basic Education, NIED 2016), natural sciences learning area comprises the following subjects: Environmental Learning (Pre-Primary), Environmental Studies (Grades 1-3), Natural Science and Health Education (Grades 4-7), Elementary

Agriculture (Grades 5-7), Life Science (Grades 8-9), Physical Science (Grades 8-9), Agricultural Science (Grades 8-12), Biology (Grades 10-12), Physics (Grades 10- 12) and Chemistry (Grades 10-12).

Biology is one of the subjects in the Namibian curriculum and it is offered in Ompundja circuit in the Oshana Region. The region is characterised by a high population of school-going age children with limited teaching and learning resources, which makes it difficult for the successful implementation of the Biology revised curriculum. In spite of this national initiative for the advancement of education in Namibia, the previous teaching experiences of teachers for the revised Biology curriculum continue to be unknown and undocumented. This is particularly the case in Ompundja Secondary schools, where five Secondary schools that are also implementing the revised curriculum still do not have their examination results for most subjects, including Biology trading at a level less than 30 percent.

Teachers play a crucial role and are a defining aspect in the context of curriculum implementation; as such, it is of great importance to learn about their experiences, roles, attitudes, and views in relation to curriculum implementation (Kelly, Wright, Dawes, Kerr & Robertson, 2019). Furthermore, it was also shown that learners' attitudes and behaviours are significantly impacted as well as their academic performance if the curriculum is not grasped properly (Kelly et al., 2019). Moreover, their research did not venture beyond a simple acknowledgement of teachers' role as crucial agents of curricular implementation. In support of this, there has been a source of concern and controversy regarding the minimal consultation with teachers by the drafters of the curriculum (Hakutumbulwa, 2021).

It is against this background that the researcher deemed it crucial to focus on the experiences and roles of Biology teachers at Secondary schools in the Ompundja Circuit as they implement the revised Biology curriculum.

1.2 Statement of the problem

It is not uncommon that teachers are often entrusted to implement a revised curriculum with very little to no training given on how to implement such a curriculum (Kelly et al., 2019). Consequently, such tendencies hamper effective curriculum implementation (Johnson et al., 2012). In the context of the above-mentioned conditions, it is necessary to be acquainted with what teachers do daily to ensure that the revised curriculum of Biology is effectively implemented in Ompundja Circuit.

The main problem is the fact that curriculum experts lack definite knowledge as to whether or not the revised Biology curriculum was successful implemented because of the lack of knowledge regarding these experiences, especially in the teaching of Biology. It is thus important and necessary to investigate the perspectives of Biology teachers in the Ompundja Circuit of Oshana Region on the implementation of the revised Biology curriculum.

1.3 Research questions

The study endeavoured to answer the following main questions.

1.3.1. What are the teachers' experiences when implementing the Biology revised education curriculum in Ompundja Circuit?

1.3.2. What are the roles and responsibilities of Secondary school teachers in the implementation of the revised Biology curriculum?

1.3.3. How can the implementation of the revised Biology curriculum be enhanced in Ompundja Circuit?

1.4 Significance of the study

The findings of this study will enlighten the actual challenges in the implementation of the Biology revised curriculum from the perspective of teachers who are primary custodians. The identified challenges and proposed alternatives will serve as a "roadmap" on what should be done to improve the teaching of the Biology revised curriculum. The study results will form a baseline for future research.

1.5 Limitations of the study

The study was only limited to selected schools in Ompundja Circuit due to resources, such as time and finances. As a mitigating factor, only schools that were easily accessible in Ompundja circuit were selected.

1.6 Delimitations of the study

Because of limited funds and time, the study was only limited to the five selected Secondary schools in the Ompundja Circuit in Oshana Region, Namibia. Other schools and teachers could have employed better information, but they were not part of the sample due to the sampling strategy employed. Similarly, the choice of the Oshana Region was based on convenience and ease of access for the researcher of information and research sites. This does not mean, however, that other regions could not have offered richer information regarding the research problem of this study.

1.7 Definition of terms

Curriculum

Curriculum refers to an interrelated set of plans and experiences that a learner completes under the guidance of the school or learning institution (Hewitt, 2006).

Circuit

Circuit in this study refers to a group of schools in a geographical area under the inspection of one Inspector of Education.

Biology

According to (Ministry of Education,Arts and Culture (The National Curriculum for Basic Education, NIED 2016), Biology is a subject in the field of natural science that involves understanding scientific processes and being able to apply scientific thinking and skills. Generally, Biology involves the study of living organisms, from single-celled organisms to multiple-celled plants, animals, and humans.

Heads of Department

Heads of Department in this study refers to the management of teachers responsible for subject(s) departments.

1.8 Summary

In this chapter, the researcher provided background of the study. This chapter included essential information such as the statement of the problem, research questions, and significance of the study, its limitations, and de-limitations, and definition of terms.

The next chapter (Chapter 2) outlines the theoretical framework of this study. To further elucidate the application of the revised Biology curriculum implementation, relevant literatures were employed to clarify the implementation of new curriculum in the education system.

CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

This chapter examined the theoretical framework that served as the basis for approaching the research project. This section also provided a literature review on the topics of teachers' experiences and teachers' roles and responsibilities in curriculum implementation. The researcher explained her motivations for doing the study and provide questions designed to shed light on gaps in the existing body of research in this section.

2.2 Theoretical Framework

The Concerns-Based Adoption Model (CBAM) theoretical framework provides a new angle on how people respond to and adapt to innovations and changes (Hall & Hord, 2020). The goal of this theory is to help educators to better describe, quantify, explain, and comprehend the transformation they undergo as they work to actualize the curricula content and pedagogical practices (Leedy & Ormorod, 2010).

According to the Concerns - Based Adoption Model (CBAM), educators have a red flag that must be addressed before they can successfully implement the new curriculum and adjust to any change (Hall & Hord, 2020). According to the Concerns-Based Adoption Model (CBAM), classroom educators should play a central role in bringing about curriculum reform (Hall & Hord, 2020). Stage of Concerns (SoC), Level of Use (LoU), and Innovation Configurations (IC) are the three tiers that make up the Concerns-Based Adoption Model. Stage of Concerns (SoC) is a model developed by (George, Hall & Stiegelbauer, 2016) that focuses on teachers' reactions to anxieties about implementing a change. Level of Use (LoU) is the second phase of the Concerns - Based Adoption Model (CBAM) and outlines how people act as they encounter and apply a new curriculum. LoU

highlights the improvement in results that occurs when educators gain experience with and proficiency in the use of a given innovation.

The final step of the Concerns-Based Adoption Model is Innovation Configuration (IC), which specifies the new programme or practice to be implemented in the classroom and determines efficient means of aiding educators in their work with the altered curriculum. Successful curriculum implementation relies on teachers' participation and ease with taking initiative, as observed by (Cooney, Beckman, Lloyd, Wilson & Zbiek, 2019). (Cooney et al., 2019) also stressed the importance of involving change facilitators in launching a new educational initiative, as these individuals play a pivotal role in putting into practice a new curriculum. For teachers to properly execute such changed curriculum and adjust to change, they require direction and support, which might be difficult to come by, during the innovations and implementation process (Joel & Ruhan, 2016). As a result of the foregoing, the researcher decided to use the theory to guide the investigation into the experiences and roles and responsibilities of Secondary school teachers towards the implementation of a revised Biology curriculum in the Ompundja Circuit of the Oshana Region of Namibia.

2.3 Teachers' roles and responsibilities

While specialists and administrators spend countless hours developing a curriculum, (Stellar, 2016) argues that teachers remain the major pillars in the effective implementation (i.e. teaching and training) of the designed curriculum.

The role and responsibilities of teachers in the curriculum implementation process is to help learners to develop an engaged relationship with the content (Makuwa, 2004). Active learning will increase the focus and retention of the curriculum, resulting in an exciting

learning environment (Makuwa, 2004). The curriculum process provides an opportunity for teachers to be creative and put their unique stamp on the roles and responsibilities as stated below when implementing the curriculum.

Anyiendah (2017) claims that a teacher is an actor who plays a number of roles and responsibilities such as letting learners to participate in science fairs by giving learners some quizzes to do. Different literatures have posited different teachers' roles and responsibilities such as:

2.3.1 Lesson Planning

In his study that looked at the roles and responsibilities of the teacher in the Biology classroom conducted in USA, Finlinson (2016) explains that a teacher designs a detailed lesson plan based on specific lesson objectives that are stipulated in the syllabus, by preparing different types of activities that meets the needs of all learners. Through writing a lesson plan, teachers design the appropriate teaching materials and provide instructional strategies needed for their learners. Teachers' participation in planning lessons makes it easier for them to set the appropriate time for how long each activity might take. In his article that discussed the formulation of a lesson plan, Al-Zoubi (2018) states that the specific lesson objectives stipulated in the syllabus are specific knowledge or skills that learners should master by the end of the lesson or unit and this makes it easier for teachers to spot out what learners are expected to know at the end of the lesson or unit. He further posit that each day should have an overall purpose or goal that learners should be able to accomplish by the end of the class period.

Additionally, Shikongo (2020) , explains that although it is the role and responsibility of the Biology teachers to carefully plan lessons that will give learners the chance to

contextually practice the Biology, through lesson planning, teachers also develop flexibility to meet the present needs of the learners. Sharing the same sentiment, Kruss (2016) argues that Biology teachers need to be flexible to adapt plans and change course if the learners are showing signs of misunderstanding, boredom, or frustration during lesson presentations.

In a research project conducted in Ghana on the implementation of the basic curriculum for Biology by Torto (2017), asserts that lesson plan is the initial teaching and learning material that is prepared to facilitate the teaching and the learning situation effectively. He further, claims that for a teacher to implement a new curriculum, his or her preparation for the lesson is very crucial. If the teachers do not prepare the lesson plans, their teaching becomes difficult since the lesson preparation is a systematic guide as to how the teacher's lesson should unfold (Torto, 2017). In another research study by Bond (2017), it was found that those teachers who do not prepare their lessons due to various reasons, encountered challenges in their implementation of the Biology curriculum in Ghana. Closely linked to that, Manyarara (2015) in a study conducted in Zimbabwe argues that lesson planning assists teachers to achieve what they want and direct them on how to deliver the subject content to learners. Lesson plan assist teachers on actual teaching and help teachers to evaluate on how successful the lesson was. It is through lesson planning that teachers evaluate their weakness and strengthens and if there are weakness, the teachers have to re-teach that topic.

In Namibia, the Ministry of Basic Education, Arts and culture (MoEAC ,2019), The National Policy for Natural Science clearly states that written lesson preparation is compulsory for every teacher, irrespective of experience. It further asserts that a successful

lesson plan should include the date, time, theme and topic, teaching and learning materials, lesson objectives and basic competencies to be achieved. Furthermore, the presentation part of the lesson plan should consist of the following: a short appropriate introduction, monitoring of homework, presentation of the subject content and a suitable conclusion (MoEAC, 2019).

In addition, the policy emphasises that after lesson delivery, the teacher should write critical reflection on the lesson, noting how teaching strategies could be changed to meet the lesson objectives (MoEAC, 2019). Besides that, Carlson (2018) also notes that if a teacher is well prepared for the lesson, the delivery of the lesson is done smoothly. She also argues that a well-prepared teacher will not get stuck in the middle of the lesson because the teacher knows how to manoeuvre to get through the lesson.

The above arguments seem to indicate that lesson planning serves as a useful tool for the Biology teachers in enhancing their learners' performance. Effective planning should also be reflected in every Biology teacher's classroom management for the effective implementation of the Biology revised curriculum (Brodier, 2019).

2.3.2 Classroom Management

In a study conducted in India on the role and responsibility of a teacher in teaching Biology as a science subject, Carlson (2018) explains that the teacher's role and responsibility as a manager is to manage the classrooms effectively. Classroom management is an essential role for teachers when presenting their lessons in classrooms because it maximize appropriate behaviours among learners (Carlson, 2018). Cooney et al., (2019) asserts that effective classroom management creates a positive conducive

environment that enhance learners to perform very well academically. Moreover, they claim that perfect classroom management enables Biology teachers to facilitate the learners while performing different activities in the classroom. Furthermore, effective classroom management makes teachers to manage the time effectively to cover the syllabus within the given time limit and also evaluates the learners' performance (Archana & Rami, 2019).

In the same vein, Farhana and Muhammad (2016) have emphasized the importance of classroom management in realising learners' outcomes. They indicate that through effective classroom management, teachers are able to motivate their learners to study hard and perform very well at their schools. Interestingly, De Nobile, Lyons, and Arthur-Kelly (2017) believes that classroom management is more inclusive of the elements of creating a positive learning environment. De Nobile et al. (2017) further asserts that classroom management develop and maintain a positive learning environment for learners to learn best. Therefore, a teacher need to create a supportive learning environment that embraces diversity and culturally sensitive for all learners (De Nobile et al., 2017). De Nobile et al., further stated that classroom management creates a positive learning environment for effective teaching and learning, and establishing a positive classroom climate is the key for helping all learners to achieve success.

In a research study conducted in Kenya, Jepketer, Kombo and Kyalo (2015) postulate that effective classroom management bestows in learners a sense of responsibility, self-control and realisation of optimal learning. Similarly, Pearson (2021) argues that effective classroom management does not only has direct consequences for good academic outcomes, but also foster healthy social and emotional development in learners. It is thus

necessary to create a positive conducive classroom environment for the learners to perform well academically.

The Learning Support Teacher's Manual, (MoEAC, 2014) defines classroom management as means of establishing and maintaining a routine in the classroom that allows teaching and learning to proceed effectively. It further highlights that through classroom management, a smart teacher plans everything from the seating arrangement to what happens when the bell rings at the end of the period.

Furthermore, teachers should create classroom environment that enables learners to work both independently and collaboratively, while ensuring that timetable, planned activities and suitable teaching and learning resources are effectively managed through the lesson.

In the same line of view, Nkandi (2015) indicates that among the efforts towards creating school environments that are conducive to teaching and learning, the Namibian government has instituted the Education Act (2001), (MoEAC, 2001) which comprehensively stipulates the code of conduct for the Teaching Service Staff that is relevance to both teachers and learners.

He further points out that the objectives of the Code of Conduct for the Teaching Service Staff (MoEAC, 2001) are that teachers are generally expected to, among others things: (1) Establish a safe, disciplined and purposeful school environment dedicated to the improvement and maintenance of the quality of the learning and teaching process. (2) Create a caring and nurturing environment for learners to enable them to develop into caring, honest and responsible adults.

Moreover, Nkandi (2015) elucidates that Educational Acts, policies, plans, and programs are set to improve the quality of education in terms of ensuring a conducive environment for teaching and learning. However, how teachers play their role within the classrooms could influence the situation regarding class management (Pick, 2018).

To add on, Sayan and Mertoğlu (2020) suggests that, Biology teachers should engage in appropriate professional development to learn how to manage their classrooms more effectively and create a more stimulating learning environment.

2.3.3 Teaching and Learning Materials

According to Khan, Salahudinn and Rahma (2020) teaching and learning materials are very essential to motivate learners towards learning and to capture the content of Biology knowledge easily. Khan et al. (2020) further acknowledge that a stimulating atmosphere for Biology teaching can be created by displaying posters, charts, maps, advertisements, timetables and signs together with works produced by the learners themselves in the classroom. In fact, teaching and learning materials that can be used in a Biology classroom are enormous and their use would be suitable and appropriate to the learners' needs (Alderman, 2016). Sharing the same sentiment, Küçükler and Kodal (2018) in their study conducted in Turkey stress that to ensure effective learning of Biology in classes, teaching and learning materials such as cards, posters, maps, and textbooks should be used.

On the contrary, Alderman (2016) assume that electronic teaching and learning materials communicate better in Biology than using traditional teaching and learning materials. Bajrami and Ismaili (2016) posit that Biology teachers should use computers, note pads, projectors, and audio-visual tools to facilitate the teaching process in order to enhance the

performance of their learners in classrooms. Similarly, Archana and Rami (2019) points that using the video materials in teaching Biology helps learners to perform better. Besides that, using video materials enhances learners' attention span resulting in better retention of the Biology content (Alberto & Troutman, 2010).

In a South African context, Bester and Brand (2018) propound that although no technology is able to replace the role of the Biology teacher in the classroom, it can however be successfully integrated into lessons which could maximize the learning experience since technology is being becoming an integral part of the life world of today's learners.

Assuredly, having brought up with technology, present day learners are more used to absorbing information from the screens than from the printed pages, and learners finds teachers who use technology to be more reliable and knowledgeable than those who do not (Bester & Brand, 2018).

In a study that investigated the teaching and learning materials availability and teachers' content delivery in Secondary schools in Rwanda, Orodho and Benjamin (2021) established that the challenges of unavailability and inadequacy of electronic teaching and learning materials was found to negatively affect teachers' effectiveness in the use of teaching methods as well as learners' attainment of good academic results in Biology. Therefore , Orodho and Benjamin (2021) recommend that teachers should fulfill the needs of all learners by playing the role of the technology teaching and learning materials which are visually attractive and auditory stimulating.

According to Nkandi (2015), for the purpose of obtaining excellent performance, Namibia's Ministry of Education, Art and Culture has developed a National Standard for Schools, a regulatory framework that includes the School Development Plan (SDP) and Plan of Action for Academic Improvement (PAAI). He further asserts that one of the Key Performance Indicators contained in these documents include, among others the provision of resources (e.g. adequate physical resources and teaching and learning materials). In a similar vein, (MoEAC, 2019), reports for Namibia to respond to providing suggested actions and undertake quality education, ensuring adequate infrastructure and providing teaching and learning materials in schools is the key to be performed. Moreover, the Curriculum for Basic Education of (Ministry of Education,Arts and Culture (The National Curriculum for Basic Education, NIED 2016), stated that Biology teachers that do effective learning and teaching are closely linked to the use of teaching and learning materials such as books, posters, charts and media like radio, newspapers and audios.

Furthermore, Biology teachers were urged to select and develop the most appropriate teaching materials and media for the learners to enrich and reinforce Biology learning (Ministry of Education,Arts and Culture (The National Curriculum for Basic Education, NIED 2016). Coupled with the above arguments, Simasiku (2017) also notes that good Biology teachers enter the classroom with prepared teaching and learning materials, knowledge, capability and ambition to take one more Biology learner up to standard. All these arguments appear to imply that the quality of Biology teaching and learning is directly related to the quality of teaching and learning materials that Biology teachers use in Biology classrooms.

2.3.4 Assessment and evaluation

According to Sumardi (2017), most researchers have acknowledged that in the learning process, assessment is a role and responsibility of the teacher gathering information related to the learners' learning progress in order to improve their process in teaching; hence it can improve the learners' performance. In their research studies conducted in Turkey, Mellati & Khademi, (2018), argue that assessment reveals how many learners have achieved the learning objectives in a particular subject content, how many have difficulties or problems with learning that particular subject content, and techniques that are useful in teaching that subject content. In addition, assessment helps teachers to evaluate the strengths and weakness of learners and motivate them, and provide teachers with useful feedback about learners' subject content acquisition (Joel & Ruhan, 2016).

Torto (2017), in a study conducted in Ghana that looked at the implementation of the basic curriculum, asserts that continuous assessment is a mean of measuring what the learners knows and have learned, as well as giving feedback to the learners. Torto (2017), further mentions that continuous assessment is essential for the Biology teachers to judge learners' achievement and weaknesses in Biology.

In the same vein, Sethusha (2018) adduces that South Africa's Curriculum and Assessment Policy Statement (CAPS) requires teachers to use continuous assessment to identify, assess and provide learning support to learners who might experience barriers to learning and development. Moreover, teachers are expected to use both formal and informal assessments to ensure that assessment is accurate, objective and fair and has used clearly defined learning outcomes and assessment standards to plan for formal assessment tasks.

According to Hamakali and Lumbu (2016), assessment in Namibian schools remains largely depending on summative assessment results. They argue that even though the Towards Improving Continuous Assessment in Schools policy guide (Ministry of Basic Education and Culture, 1999) provides guidelines on the use of a variety of assessment tools in Namibian schools, all teaching is geared towards national examinations, the final product, with little focus on the learning process, as it relies largely on summative assessment.

In the same view, Zannier and Lumbu (2016) maintain that the Towards Improving Continuous Assessment in Schools (Ministry of Basic Education and Culture, 1999) guide prescribes the nature and frequency of summative assessment, but gave limited information on formative assessment.

Based on Hamakali and Lumbu (2016) and Zannier and Lumbu's (2016) arguments, the policy on assessment guidelines appears to have overlooked at the major roles of the teachers through formative assessment in the teaching and learning process. However, through Formative assessment, the Biology teachers would collect information about each of their learners, through a variety of activities which will help them to assess the learning progress of learners and identify those learners that are struggling and adjust their teaching to support, thus enhancing the performance of learners in Biology.

2.4. Teachers' experiences

Generally, teachers feel challenged when they are implementing a new curriculum (Michael, 2012). For instance, Kelly (2009) cautions that teaching Biology with little knowledge does not only yield negative academic results, but also influences the attitudes

and behaviour of learners, negatively. The experiences of teachers on the implementation of the curriculum were reviewed based the following experiences:

2.4.1 Teachers' training

Various recent studies have found that implementation of the Biology curriculum fails because curriculum leaders neglected to provide teachers with adequate training opportunities and it is assumed that teachers already have the expertise to implement the change in a curriculum (Chirimbana & Haimbangu, 2018). Emery (2020) revealed that any curriculum changes should also involve changes in teaching and learning methods in order to cope with newly introduced or transformed content.

Andrews and Taylor (2018) indicates that through training, teachers acquire the right knowledge to teach the content of the subject. Teachers' training equip teachers with appropriate strategies that they can use to make sure that all learners are learning and benefiting (Andrews & Taylor, 2018). Teachers' training is needed because of the fact that the current generation learners are living in the world of technology and they do not understand the use of traditional methods anymore (Badugela, 2019). Badugela (2019) further stated that teachers need to be trained especially on how to use technological teaching aids, to be able their learners to perform very well since many learners are exposed to the technology.

In a research study conducted by Davis (2018), posit that teachers who are not trained regularly in their subject contents tend to have poor relationships with their learners.

When a new policy is implemented in schools, both experienced and new Biology teachers need to get used to it and be trained in the new system (Davis, 2018). Kouwenhoven

(2019) supports this statement and argues that, teachers need to be trained, should there be a new policy to be implemented because through training, teachers learn new strategies and skills. Marongwe (2021) contends that Biology teachers are more likely to respond positively to initiatives if they are given additional support during the implementation of a new curriculum.

Naukushu and Haimbangu (2021) stated that lack of teachers' In-service Education and Training (INSET) is one of the challenges faced when new curriculum is developed and sometimes teachers are not given the proper training to cope with the new content. INSET is therefore seen as a process whereby Biology teachers continuously renew and update their skills, knowledge and attitudes during their career (Channon, Smith, Head, Macrae & Chasakara, 2020). Channon et al., (2020) further stated that insufficient In-Service Training for teachers in teaching Biology in schools is impeding the successful implementation of the Biology curriculum in schools. This chasm is what makes the teaching of Biology in classrooms so difficult (Channon et al., 2020).

Chirimbana and Haimbangu (2018) stated that, where new approaches to teaching and learning are introduced, teachers' training becomes an unavoidable activity. Blaikie (2006) observed in an Australian study that many teachers lacked the knowledge and skills to utilise computers when teaching Biology and this is due to the fact that, teachers were not trained on how to use computers in Biology lessons. Another global survey done by Bort (2015) of nationally representative samples of schools from 26 countries indicated that lack of teachers' knowledge and skills has a significant barrier to the teaching of Biology in both Primary and Secondary schools.

Due to a lack of Biology teaching knowledge and skills, many teachers in Namibia choose not to use Biology teaching learning and media in classroom circumstances, according to the findings of a research done by (Simon & Ngololo, 2007).

Blaikie (2006) further stated that most respondents in a recent research in South Africa were apprehensive about entering the classroom with minimal Biology teaching skills. Correspondingly, Bandele and Farem (2020) a study conducted in Nigeria found out that the major challenges facing the implementation of a curriculum are lack of In-Service Training and poor conditions of service of teachers. They further stated that, outdated equipment, shortage of financial and human resources, unstable government policies, lack of standard workshops for teachers, and a lack of related modern instructional materials also affect the implementation of Biology curriculum negatively.

Teachers need to be supported through attending trainings in order for a curriculum to be implemented effectively. Education systems need to go away from teachers knows the subject content already to teachers must be trained regularly and this can be the only best way of implementing a new curriculum effectively (Pick, 2018).

2.4.2 Teaching competencies and skills

Pick (2018) defined teaching competencies and skills as the combination of knowledge, skills, attitudes, values and personal characteristics enabling the teacher to act professionally and appropriately in a situation. According to a study conducted by Simon and Ngololo (2015), found that teachers' competencies and skills is another hindrance in the teaching of various subjects in schools. Simon and Ngololo (2015) stated that due to the insufficient competencies and skills of these teachers in teaching a subject, many

teachers are not enjoying their teaching profession and this makes the new curriculum not to be implemented effectively. The successful Biology teaching requires teachers to have the relevant competencies in terms of pedagogy, and content knowledge and the skills to interpret the curriculum of Biology (Gilead, 2016). A teacher who is well competed in teaching has a high potential in creating an environment that is fair and conducive to all learners arising from different various backgrounds (Gilead, 2016).

According to Alderman (2016), in Denmark, teachers avoid using Information Communication Technology (ICT) resources in their teaching of Biology due to a lack of ICT abilities. As a result, one of the factor avoiding these teachers in using ICT in teaching Biology may be a lack of teacher's competency. It was also noted that if teachers' teaching is less effective, this makes the learning process to be less effective as well (Salahuddin, 2003). Salahuddin (2003) further noted that lack of Biology skills exposure to learners also serves less opportunity for learners to understand Biology content very well.

According to Brodier (2019), asserted that through teachers' training, teachers gain more knowledge and experiences, and are likely to conduct remedial Biology classes, and this will assist learners to improve in Biology content and, at the same time it motivates learners to learn and explore Biology further.

2.4.3 Monitoring and evaluation

For educational programmes to be successfully implemented, ongoing interaction between policy makers and implementers is necessary (Anderson & Elloumi, 2017).

Ngara, Ngara and Ngwarai, (2020) showed that programme coordinators need assistance and guidance when new programmes are being implemented. Lack of monitoring and evaluation collaboration can be made meaningful if assessments are carried out formatively as programmes are being implemented. In addition, if support services are not provided during curriculum implementation, teachers will not perform as expected since they need their teaching efforts to be evaluated for them to realise areas that require improvement (Andrews & Taylor, 2018). The school management, advisory teachers and inspectors should monitor the process of teaching and learning within the schools, in accordance with the curriculum policy documents and other policies (Chirimbana, Miranda & Nakashole, 2020).

Biology teachers' performance evaluation criteria should be clearly spelt out and communicated to all teachers for Biology (Joel & Ruhan, 2016). These teachers should be evaluated impartially considering the performance standard set. Monitoring and evaluation processes can assist the Biology teachers in evaluating their performance and identifying the factors which contribute to their service delivery outcomes (Belland , French & Ertemer, 2009). Moreover, Monitoring and evaluation help to provide an evidence base for public resources allocation decisions and, helps identify how challenges should be addressed and successes replicated.

Burta (2018) states that Biology teaching success lie in the availability of proper monitoring and evaluation structures which can be used by management to assess their productivity. On this note, Okeahalam and Akinboade (2020) stated that monitoring and evaluation helps to improve teachers' performance and achieve good results. Its goal is to improve current and future management of outputs, outcomes and impacts.

2.4.4 Teaching resources

Joel and Ruhan (2016) stated that for teachers to properly execute a changed curriculum and adjust to change, they require direction and support of teaching resources, which might be difficult to come by during the innovations and implementation process. The following aspects are of great significance in the implementation of the curriculum: physical resources, such as classrooms and textbooks (Cooney, Beckman, Lloyd, Wilson, & Zbiek, 2019).

A study conducted by Joel and Ruhan (2016) in Malaysia, found that while schools may have a laboratory full of modern computer hardware, and of course too much content of syllabus, the teaching and learning process becomes null and void without the availability of the relevant teaching resources such as Biology textbooks and other teaching resources to support teaching and learning of Biology in schools (Channon et al., 2020).

Channon et al. (2020) listed projectors, digital cameras, printers, photocopiers, tablets, pen drives, interactive white boards, and DVDs as resources that can be used for teaching Biology and other subjects. The lack of digital competence among learners is due to a lack of teaching resources in the classroom (Badugela, 2019). He went on to remark that the availability of digital materials and the supply of Information Communication Technology (ICT) training to teachers encourage them to assist their learners in the construction of knowledge rather than teaching knowledge. The presence of ICT in education allows for new ways of learning, for learners and teachers.

From experience, one is aware that no meaningful teaching and learning can take place without adequate teaching resources and this applies to curriculum implementation as

well. For the officially designed curriculum to be fully implemented as arranged, the Ministry of Education should provide schools with adequate teaching resources such as textbooks, teaching aids and stationeries to enable curriculum implementers and learners to play their role up to par in the curriculum implementation process.

Abramo, Cicero, & D'Angelo (2019, p.67) suggested that "the government must also provide physical facilities such as classrooms, laboratories, workshops, and libraries in order to create a conducive environment for the curriculum implementation to take place". Workshops such as instructional materials and resources workshop on curriculum implementation have a great influence on the implementation of the Biology curriculum (Abramo et al., 2019). During instructional materials and resources workshop, curriculum implementers select and use instructional materials and resources like textbooks, digital resources, and audio visuals and other teaching aids to support the curriculum.

Additionally, Aguilar (2020) reported in her study conducted in Indonesia that there were inadequate teaching resources at schools and learners performed poorly in Biology due to unavailability of teaching resources. She also found that teachers cannot give attention to individual learners in classroom because there are so many learners in one class and teaching resources on the other hand are not enough to assist all learners.

Meanwhile, Chirimbana and Haimbangu (2018) noted that the education system in Namibia is confronted with many problems inherited from the pre-independence period. Lack of infrastructure, lack of trained personnel, high failure rates, an insufficient teacher-learner ratio and a lack of quality learning materials for all learners, are among the major problems facing the Namibia Education system. They concludes that, even though the

government and stakeholders were able to at least reduce these problems during the last ten years, they remain a problem, especially in some of the poorer rural schools in the country.

On the similar note, Chirimbana, Miranda, and Nakashole (2020) found that Biology education in the senior secondary schools in Namibia is affected by many factors. These includes the lack of teaching and learning resources, management styles, quality and frequency of learners' work, lack of contextual teaching, and lack of monitoring and evaluation-based system.

2.4.5 Electricity

Many schools are still without electricity; and as a developing country, Uganda's government has not been able to connect all of the country's schools to the national grid (Brodier, 2019). As a result, schools that fall under these categories are disadvantaged and may not be able to offer Biology taught using ICT.

According to a recent study conducted in Afghanistan, schools without electricity do not have access to the internet or useful online tools that are critical in the teaching and learning process especially in the teaching of Biology (Andrews & Taylor, 2018). Teachers are also unable to make presentations, printouts, or employ multimedia instructional techniques. This reduces the quality of teaching they can deliver to their learners and at the same time is hindering the implementation of a curriculum to be implemented effectively (Joel & Ruhan, 2016). Electricity is the driving force behind all Biology teaching in all schools, and its absence has major negative implications on teaching and learning process (Abramo, Cicero, & D'Angelo, 2019). Abramo et al., (2019)

further stated that without electricity at schools, learners have limited access to teaching resources and this makes them to perform poor in their school activities.

In poor countries, more than 1.1 billion people do not have access to electricity, and Africa has a population of 590 million people, and the percentage of rural electrification is extremely low, at only 14%, slowing economic development in many areas. In schools, electricity promotes the use of ICT tools such as mobile phones and televisions, as well as computers with internet access, audio tapes, projectors and slide projectors, printers, and copy machines in the teaching of Biology and science subjects (Alderman, 2016). In a variety of ways, researchers found that schools with electricity outperform those without.

2.4.6 Basic knowledge

According to Patius (2020), a key worry in today's world is a lack of basic knowledge. This finding is backed up by Archana and Rami (2019), who stated that many learners still cannot handle basic Biology, and when technical issues arise, they find it difficult to solve the problem in such a situation. They struggle in class, with mastering the Biology concepts which are being communicated in Biology (Chirimbana & Haimbangu, 2018).

Chirimbana & Haimbangu (2018), further stated that basic knowledge is the most important factor that influences the learning and learners' achievement. The amount and quality of basic knowledge that learners have positively influence both knowledge acquisition and capacity to apply higher-order cognitive problem solving among learners. On the same sentiment, Simon and Ngololo (2015) points that learners who have basic-knowledge to the subject tends to perform well in their school subjects than learners who

do not have. Learners with rich base of basic knowledge finds it easier to learn well than those without and as a result learners without basic knowledge perform poor in school subjects, making it difficult for teachers also to implement the Biology curriculum effectively (Simon & Ngololo, 2015).

2.4.7 Schools' technical support

Teachers will not be able to overcome the barriers preventing them from making the learners pass if they do not have adequate technical support in the classroom and access to whole-school resources (Alderman, 2016). This viewpoint was backed up by Ottevanger (2019), who stated that one of the most significant impediments to Biology teaching and learning in primary and secondary schools is a lack of technical support and teachers were found to be hampered by technical issues.

"Technical hurdles included waiting for websites to open, failing to connect to the internet, printers not printing, malfunctioning computers, learners and teachers failing to log in to particular websites, and teachers working on obsolete computers," according to (Zimba, Roderick & Beau, 2021,p.123). These authors further argue that technical skills are needed to support the entire Biology curriculum implementation process and make teaching and learning more engaging. Simon and Ngololo (2015) highlighted that regardless of the level of technical support and access available to teachers, whether they have twenty years of experience or are new to the profession, technological issues create impediments to smooth lesson delivery.

2.4.8 Lesson delivery time

According to several recent studies, many teachers are capable of teaching Biology in the classroom, yet they still do not complete their syllabi due to limited teaching time given

(Aguilar, 2020). Biology teaching in the classroom has been hampered by time constraints and the difficulty of scheduling enough teaching time for the classes (Brodier, 2019; Davis, 2018; Marongwe, 2021; Mertens, 2019). Davis (2018) found that the most prevalent problem mentioned by all teachers was a lack of time since they have so many classes to teach and the numbers of learners per class is too high.

Marsh (2019), in a study conducted in Uganda, claims that lack of time affects their capacity to finish tasks in many elements of their work, with some of the participants particularly saying that the teaching of Biology require more time unlike the teaching of other school subjects. These include the time spent in preparing for classes, exploring and practicing (Cooney, Beckman, Lloyd, Wilson, & Zbiek, 2019).

2.4.9 Teaching experiences

Several studies have discovered that the teaching experience of teachers have an impact on the successful teaching and learning of Biology in the classroom (Abramo, D'Angelo & Ciero, 2019; Davis, 2018). Similarly, findings were observed in a study by Zimba, Roderick and Beau (2021) who discovered that teachers' teaching experiences is highly connected with their ability to make learners perform well in a subject. Learners' academic performance has an influence on the teachers' years of teaching experiences and as result learners who are taught by more experienced teachers outperform well academically than those that are not (Zimba, Roderick & Beau, 2021).

Holloway (2020) agreed with Babbie and Mouton (2020) when they indicated that teachers with more subject teaching experience makes learners perform well in their

subjects. On the same sentiment, with regard to teachers' experiences, several studies have found a positive relationship between teachers' experience and learners' outcome (Marsh, 2019; Zimba, Roderick & Beau, 2021; & Abramo, et. al., 2018).

Furthermore, Abramo, et. al., (2018) stated that the less the number of teaching experiences teachers have, has a negatively great impact on the implementation of Biology curriculum because less experienced teachers have little knowledge on the Biology content, making it more difficult for teachers to implement the Biology curriculum.

2.4.10 Curricula or language

Curricula and language of instruction, according to Ajowi (2020), are the key roadblocks to effective implementation of the Biology curriculum in schools. Ajowi (2020) claimed that there is a very strong link between the curricula or language of instruction and learners participatory in classrooms. Learners who are taught Biology curriculum in their local languages tend to perform poorly than those that are taught Biology curriculum in the medium of instruction that is used to teach that particular subject (Albert, 2021).

Biology is a subject that requires one to grasp the concepts and be able to communicate them in writing. It also requires one to analyse data from diagrams and communicate them in words and know the theories and be able to apply them, therefore, a lack of proficiency in English to communicate Biology to learners also results in the learners being unable to communicate their ideas (Anderson & Elloumi, 2017).

According to Blaikie (2006), Bangladesh has a poor economy and low literacy rate as well as language and curricula issues. Schools are providing instruction using local languages

in Bangladesh, which is not included in any of the Information Communiction Technology (ICT) software packages in its whole. The inavailability of books in local languages is hindering the proper implementation of the Biology new curriculum in schools because all the textbooks are written in English (Channon et al., 2020). According to a study conducted by Holloway (2020), outmoded curricula and the medium of instruction remain the principal barriers to the Biology new curriculum implementation in Pakistani in schools (Becka & Abbott, 2019).

2.4.11 Teachers' perceptions

Alderman (2016) found that teachers' perceptions towards a certain subject has a great impact on the implementation of a new curriculum. The attitudes and behaviour of teachers towards a certain subject has a directly positive or negative influence on the affective, cognitive and social development of learners (Thompson, 2015). Thompson (2015) further stated that, in particular, if a teacher has negative attitudes towards a subject such as Biology, learners are less likely to perform well academically. In addition, Carlson (2018) suggests that teachers need to show positive attitudes towards a certain subject as this may yield a positive performance among learners.

On the assumption that the successful implementation of any policy is largely dependent on teachers being positive about it, a great deal of research has sought to examine teachers' attitudes towards the implementation of any new curriculum in schools" (Carlson, 2018). Carlson (2018) pointed out earlier that there is a host of factors to account for success in implementation, nonetheless, being positive about the implementation of a curriculum is also a factor that can contribute to that success. Nevertheless, Carey (2014) states that although the behaviour of the teachers is mostly flexible and spontaneous, it remains

beneficial to scrutinise their conceptions and attitudes because of the potential influence that these might have in the framing of behaviour patterns which may become habituated.

According to Thompson (2015, p.106), "if teachers' characteristic patterns of behaviour are indeed a function of their views, beliefs, and preferences about the subject matter and its teaching, then any attempt to improve the quality of Biology teaching must start with an understanding of the conceptions held by the teachers and how these are related to their instructional practice."

Baker (2019) further highlighted that failure to acknowledge the role that the perceptions and attitudes of teachers might play a role in shaping learners, behaviour is likely to result in misguided efforts to improve the quality of Biology teaching and learning in schools.

2.4.12 Teacher pupil ratio and motivation

Mushtaq and Khan (2015) reported in their study that teacher-pupil ratio has been found to be one of the strongest factor that makes learners perform well academically. Mushtaq and Khan (2015) further indicated that, the fewer learners the teacher has, the more closely a teacher is capable of rendering support to individual learner, and the more these learners are likely to perform well academically.

Additionally, Adolphus (2020) noted that, the greater the number of learners in a classroom, the less support each learner receives from the teacher and the less support given to learners affects learners who are struggling and need extra support. Adolphus (2020) also found that teachers cannot give attention to individual learners because there are so many of them in one class and if attention is given to individual learner, the teacher will not finish the syllabus' content. Furthermore, Adolphus (2020) noted that many

learners in a class can lead to a chaotic classroom environment which is more difficult for the teacher to manage. He further stated that having many learners in class causes hindrance in teaching-learning process in implementing the Biology curriculum effectively.

According to Emery (2020), one of the most often mentioned problems encountered by Biology teachers is that "overcrowded classes and it has an effect on teaching and learning process of Biology. Consequently, it is necessary that teaching and learning process requires comfortable and enjoyable atmosphere, otherwise, teachers might be in failure to fulfil learners' needs and achieve learning goals (Baker & Westrup, 2000). In the same vein, Kucukler and Kodal (2018), in a study conducted in Turkey posit that it is difficult to establish an interaction that is sufficient for all learners due to the overwhelming amount of learners in a class. Challenges such as monitoring attendance, checking assignments, maintaining control, and many more are typical issues worrying Biology teachers involved with big class teaching (Küçükler & Kodal, 2018).

Matshipi (2018) in a study conducted in South Africa explored the teaching strategies that teachers use to teach Biology in overcrowded classrooms and found out that teachers were facing the problem of paying attention to each and every learner in overcrowded classrooms and teachers could not spare time to provide extra help to slow learners.

This appears to suggest that in overcrowded classes, learners tend to be anonymous and attention to individual learner's needs is usually difficult. In another study by Anyiendah (2017) conducted in Kenya explored experiences of the teachers when teaching Biology in public secondary schools, the findings reveals that there is a strain on the teachers'

ability to provide quality Biology work to the learners because the teacher-pupil ratio is not proportional. The findings also shows that it was difficult for teachers to reach out and interact with all learners, especially those with learning disabilities.

In Namibia, Nuuyoma (2020), conducted a study that looked at experiences of the Biology teachers in integrating Information Communication Technology (ICT) in the teaching of Biology. Most of the respondents from both rural and urban schools said that their classes had close to 45 learners, making it impossible to pay attention to all of them at once. The fact that classes were overcrowded left very limited space where ICT facilities could also be displayed in the classroom (Amukugo, 2021).

On a different note, Nkandi (2015), reports that the staffing norms in Namibian schools have been set at 35 learners per teacher for primary and 30 learners per teacher for secondary schools. However, although the Ministry of Education has been successful in improving teacher- pupil ratio, there are still schools faced with overcrowding where they exceed the agreed benchmark, which may compromise the quality of education (Carey, 2014).

Most researches appear to prove that many learners do not benefit in overcrowded classrooms. Most findings also appear to indicate that overcrowded classrooms tend to contribute significantly to inadequate class activities for learners and effective monitoring of learners' performance, which may have a negative impact on learners' performance in Biology.

Based on the issue motivation, findings done by Carey (2014) states that highly motivated learners are likely to learn more than unmotivated learners. He further stated that learners

need to be motivated and becomes intrinsically motivated in order for them to willingly study on their own. Through intrinsically motivation, learners are more likely to achieve their potential and find success (Carey, 2014). Biology teachers need to motivate their learners so that they can perform best to the level of their abilities.

In a study done by Othman and Shaqair (2020) stated that motivation is one of the primary forces influencing the teaching and learning of Biology as a science subject. They further claimed that, motivation has been broadly recognised as a major aspect which determines the success and level of science learning. They regard motivation as one of the primary components that contributes to Biology as a science subject. Motivation influences the level of dynamic and personal engagement in the entire teaching and learning process for Biology.

In the same vein, Alizadeh (2016) underscores that learners become motivated to learn when they perceive themselves as competent individuals. Learners are also motivated when they work with materials tailored to their level and can see clear goals in their activities. Additionally, learners' studies become more meaningful when they are presented with challenging tasks. Furthermore, Alizadeh (2016) stated that, learners' motivation is fostered when they live in a safe environment and have the opportunity to express their psychological needs for success, recognition, and acceptance. Their intrinsic motivation is enhanced when they understand that learning is for their own benefit rather than solely for their teachers.

Educational psychologists says that motivation enhances the quality of learning in learners, for example learners pay attention more and retain information. In support with

the educational psychologists' findings, Carey (2014) stated that motivation increases interest in learners in learning particular knowledge. From all these findings, one can conclude that motivation creates the chain effect in learners' performance as well as in the implementation of the Biology revised curriculum.

Apart from learners' motivation, Carey (2014) further alluded that, teachers also need to be motivated for them to be able to teach well to the best of their abilities. Motivation of teachers help policy educational markers, various educators as well as parents to make an evaluation of their related duties (Carey, 2014). Adolphus (2020) also noted that, although learners are born with the natural ability to learn, much dependents on the teachers' involvement. Adolphus (2020) further mentions that sometimes, learners' energy, drive, and enthusiasm for a subject or task may wane and therefore require continued reinforcement through external support.

Adolphus (2020) conceptualises motivation as an innate desire that drives individuals to participate in an activity because of the satisfaction derived from it. Adolphus (2020) furthermore state that, another view of motivation suggests that it is goal-directed learning, which stimulates and guide individuals towards a particular direction. When learners are motivated to learn, they are more likely to achieve the goals set for them, either by themselves or by the teacher (Abramo, Cicero, & D'Angelo, 2019). Lastly, Abramo, Cicero and D' Angelo (2019) states that teachers and learners need to be motivated for them to have a smooth teaching and learning classrooms environment.

2.4.13 Qualified teachers

Qualification of teachers have been considered as an essential catalyst that enhances learners' performance in schools (Bautista, Ng, Múñez & Bull , 2016). Bautista, Ng, Múñez and Bull (2016), investigated the correlation between teachers' qualifications and learners' outcomes and found that there is linkage between teachers' qualifications and learners' outcomes.

In a study done by Angula (2015), in Namibia, indicates that teachers that are highly qualified have high learners' academic performance outcomes than low qualified teachers. Kouwenhoven (2019) also conducted a study which examined the correlation between teachers' qualifications and learners' outcomes whereby he made a focus on the relationship between teachers' qualifications and learners test scores in which he found that lesson delivery done by a teacher having any teaching qualification in an education scored higher than the learners who were taught by teachers with no teaching qualification in education.

In support with the above findings, Angula (2015) revealed that teachers' professional teaching qualifications as well as teaching experiences have significant important role in learners' academic performance. Furthermore, Andrews and Taylor (2018) added that the effect of learners' school performance is significantly associated with teachers' qualifications and professionalism. Gilead, (2016) posit that qualified teachers encourages and support learners by helping them to grow their mindset and develop a strong sense of confidence and self-efficacy.

It is evident from the above information that teachers qualifications has a significant impact on the learners performance, thus Biology teachers need to be qualified, for the effectively implementation of the revised Biology curriculum.

2.4.14 Learners' perceptions and attitudes

A study thesis carried out in Tanzania by Brodier (2019) revealed that, learners' perceptions and attitudes towards science subjects affects course and career choices of learners. Biology as an important science subject plays a major role in learners' perceptions and attitudes towards it. In a research study conducted by Brodier (2019) that examined the correlation between learners' perceptions and attitudes towards Biology as science subject and learners' Biology outcomes achievements, it has indicated that there is a link between learners' perceptions and attitudes towards Biology and learners' Biology outcome achievements. The results showed that the learners' who have negative perceptions and attitudes towards Biology tends to perform poor than learners with positive perceptions and attitudes towards Biology.

Peters (2016) stated that positive perceptions and attitudes in learners towards a subject has numerous benefits for learners. Firstly, it enhances motivation, making learners more enthusiastic in learning and setting and, achieving their goals. Positive perceptions and attitudes in learners towards a subject boost resilience in learners, by helping them bounce back from setbacks and face challenges with confidence (Peters, 2016).

On the contrary, Kitta (2004) posit that negative perceptions and attitudes in learners towards a subject limits performance, motivation and inhibits learning. Furthermore, negative perceptions and attitudes discourage, limit and even prevent positive learning

environment (Kitta, 2004). Hence, Kitta (2004) urge learners to keep positive perceptions and attitudes in their lives when they are learning Biology in order for them to be able to explore new learning opportunities.

2.4.15 Teaching materials

Burta (2018) in a study that looked at problems with the assessment of the performance in practical science of learners with migrant background in Australia, states that the availability of education resources is believed by educationists to influence learners' performance. Furthermore, Burta (2018) argues that learners with access to more Biology resources are likely to perform better than their counterparts who are in a less resourced environment.

On the same note, Chirimbana, Miranda, and Nakashole (2020) articulate that in teaching Biology, resources such as textbooks, computers, audio- visual equipment, worksheets and other teaching materials are needed because they help learners to cultivate what they have learned. Therefore, without any sufficient teaching materials in lessons, it makes Biology teaching and learning process less attractive to learners and this lack of attraction leads to performance challenge (Carlson, 2018).

Fatiloro (2015) observes that lack of teaching resources and equipment is a challenge that hinders effective teaching and learning of Biology as a science subject in Nigeria schools. He further claims that most schools and colleges in Nigeria lack essential resources which could have strengthen learners' skills and assist in enhancing their performance in Biology.

Another research study conducted by Bort (2015); Andrews and Taylor (2018) in Ghana on challenges in African classrooms indicates that the teaching and learning of Biology in Ghanaian schools is majorly done through the use of traditional tools such as textbooks, dictionaries, chalkboards, workbooks and posters. In addition, he argues that most schools in Ghana lack modern technological devices like audio and video tapes, laboratories, e-textbooks, flash cards, internet facilities, and newspapers etc., which are modern teaching resources that can be utilised to improve teaching and enhance performance of learners in Biology. Thus, there appears to be a need to confront this issue so as to empower the teaching and learning of Biology and enhance the performance of learners.

Owens, Holdaway, Smith, Evans, Himawan, Coles, Girio-Herrera, Mixon, Egan and Dawson (2018) states that the utilisation of teachers to achieve maximum results is dependent on the availability and accessibility of schools materials. Teachers should be availed the opportunity for In-Service Trainings, for career improvement and development. Such In-Service Trainings will enable teachers to renew their knowledge and create effective teaching materials that enable learners to be efficient and be able to achieve their educational goals (Sullivan, Johnson, Owens and Conway, 2014). According to Onuka (2018), the Ministry of Education, Arts and Culture should outsource funds and partner with non - government organisations in order to build sufficient classrooms which can accommodate all learners in schools.

According to the National Curriculum for Basic Education for the MoEAC (2019), it makes a strong statement, reminding Namibian Biology teachers that effective learning and teaching are closely linked to the use of materials such as books, posters, charts and media like radio and newspapers. Similarly, Carlson, 2018 argue that the provision of

Biology teaching and learning materials to learners in Biology classrooms is central to learners' good performance.

Furthermore, Abramo, Cicero and D' Angelo, (2019) also argue that lack of resources such as audiotapes, computers, internet and television, negatively affect learners' performance in Biology in Namibian schools. In a study that looked at the conditions of schooling and quality of education in Namibia, Nkandi (2015), also asserts that access to educational resources can greatly enhance the learning capabilities of learners learning Biology, particularly those in rural areas where education resources are not available in their immediate environment.

Based on the above arguments, they seems to be an urge for all Biology teachers to select and develop the most appropriate materials and media, so that they can enhance performance of their learners in Biology. Therefore, negligence of using teaching aids and instructional materials by the teachers may be a reason for poor performance of Biology learners across the board.

According to Dzimiri and Marimo (2015) stated that designing public policies that effectively improve the provision of resources in schools will help to mitigate lack and inadequate availability of resources such as textbooks and other teaching aids such as posters and charts. There is no way that the goal and objectives of education can be achieved without putting in place some mechanisms in the school system. Part of the integral pre-requisites to be put in place toward the actualisation of the educational goal and objectives requires adequate provision of resources, maximum utilization and

appropriate management of educational resources to avoid wastage and to improve the quality of teaching and learning process (Dzimiri & Marimo, 2015).

From the above findings, it is an evidence that teachers faces a quiet number of experiences in the implementation of the new curriculum during teaching and learning. These experiences emanated from teachers' training, teaching competencies and skills, monitoring and evaluation, teaching resources, electricity, basic knowledge, school technical support, lesson delivery time, teaching experiences, curricula or language, teachers' perceptions, teacher pupil ratio and motivation, qualified teachers, learners' perceptions and attitudes as well as teaching materials.

2.5 Strategies to improve the implementation

Developing a curriculum is a tough assignment for teachers. However, understanding what to expect and preparing ahead of time can be of great help. Various researchers (Alizadeh, 2016; Amukugo, 2021; Carlson, 2018; Martinez, 2021; Onuka, 2018; Seven and Engin, 2021) suggested strategies for curriculum implementation from various teaching professionals.

2.5.1 Teaching and Learning Methods

Several studies have shown that there is a relationship between teaching and learning methods and learners' performance (Carlson, 2018). It has been found that teachers who used a specific style of evidence-based teaching and operate within a developmental learning paradigm had an increase effect on learners learning outcomes (Andrews & Taylor, 2018) , thus teaching and learning methods play an important role in producing good learners' performance.

Furthermore, several studies conducted on teaching and learning methods in many parts of the world have demonstrated that teaching and learning methods enhance learners' performance. Research studies conducted indicates that teaching and learning methods used by teachers make a positive impact on learners' performance. These researchers recommended that the interactive visuals and questions and answers are the most commonly used methods by teachers in teaching. However, Liswaniso (2019) suggests that despite the frequency of the two common methods in teaching Biology classes, various methods should be employed to increase the knowledge of teachers in teaching Biology in schools.

Another study on teaching and learning methods was carried out by Guloba, Kakuru and Ssewanyana (2021) in Uganda analyses the link between educational inputs, teaching and learning methods and learners' performance in Uganda's primary schools. The findings reveal that learner-centered methods of teaching are more effective compared to teacher-centered teaching methods. Unfortunately, teachers in Ugandan primary schools tend to employ more of teacher-centered methods, which render their teaching centred less effective (Guloba et al, 2021).

Put simply, the findings reveal that teacher-centered methods (writing on board, and lecturing) do not enhance learners' performance compared to when teachers apply learner-centred methods such as group work, questions and answers, discussion and sharing of ideas and learners reading in silence. Similarly, in their study that looked at teachers' perception on the causes of poor performance of grade 12 leaners in Namibia's selected

Secondary schools, Maemeko, Nkengbeza and Ntabi (2017) express that some reasons that may have caused the poor performance could be poor teaching and learning methods some teachers used when they are teaching, especially Biology and science subjects.

2.5.2 Teaching and Learning Resources

Research studies conducted in Turkey by Seven and Engin (2021) reveal that the usage of Biology teaching and learning resources is very important to the success of Biology teaching and learning. Seven and Engin (2021) mention that Biology teachers who mainly depend on schoolbooks as the only source of knowledge and leave other learning resources holds back makes learners to perform poor in Biology. Furthermore, skilled Biology teachers always review the importance and value of their textbooks and they can change them if they do not fulfil the needs of learners (Seven & Engin ,2021).

In the same vein, Howard and Major (2018) support the view that using teaching and learning resources that are amusing and enjoyable makes the subject clear and comprehensible for learners. They further argue that using supportive teaching resources to teach Biology motivates the learners to learn better and to be more aware of the learning activities and increases the success in exams. Moreover, teaching materials have to be used at all levels so that the knowledge of Biology become higher in teaching and learning (Seven & Engin, 2021). According to the study findings done by a South African scholar (Carey, 2014) indicated that rural schools need support from the government, especially financially to enhance the conducive teaching and learning environments that help to improve learners' performance. The availability of teaching resources in schools for Biology lessons is essential for the success of the subject. Learners must have textbooks available to them in order to engage in self-activities and self-learning (Carey, 2014). The

findings also collaborate with the findings of (Orodho and Benjamin, 2021) who cited that, the learners do not have luxury resources to enhance their learning at home and are therefore unable to improve their knowledge except when they are at school. This may lead to them losing interest in their schoolwork and then perform poorly (Carey, 2014).

Orodho and Benjamin (2021) believe that learners perform poor because the teaching resources are not available to support them. Similarly, Howard and Major (2018) emphasize on teacher-designed materials. Howard and Major (2018) further stated that a teacher can develop materials that incorporate elements of the learners' knowledge, or at least provide opportunities for acknowledgement and use alongside with Biology. In addition, teachers' prepared materials and activities are exactly at the right level for particular learners, to ensure appropriate challenge and level of success (Howard & Major, 2018).

In Uganda, Guloba et al.(2021) argue that the provision of more teaching materials does not ensure that teachers attend to all their lessons and teach effectively. Consequently, Teachers' performance in the classrooms can only be assured when there is an effective system of supervision of teachers' attendance to their duties and their performance in classrooms.

On the other hand, in a research study that looked at lessons learnt from teachers' perspectives on mobile learning in South Africa, (Jantjies & Joy, 2016) claims that many teachers do not have knowledge of technologies that can support learning. They further argue that, although teachers are aware that mobile phones provide access to the internet, teachers had not yet realised their potential as a teaching and learning tools. Therefore,

there is a need for adequate teachers' training and support, to facilitate teaching through technology teaching resources in both urban and rural schools.

Chirimbana, Miranda and Nakashole (2020) contended that provision of enough instructional media / materials, will assist a lot in improving the performance of learners in Biology in Namibian schools. Similarly, Zeripi (2017) points that teachers may have the required skills in teaching but teaching effectively can be a challenge if the necessary teaching and learning resources are not in place.

Admittedly, Junias (2019), stated that learners' difficulties in Biology could be attributed to lack of Biology teaching and learning resources in schools. The above arguments seem to indicate that if Biology teachers do not have necessary teaching and learning resources, it would be difficult for them to teach effectively, and the performance of learners in Biology is adversely affected.

2.5.3 Parental involvement

Studies by Knapp (2016) in Australia, Martinez (2021) in USA and Kalayci and Oz (2018) in Turkey acknowledge that parental involvement is the key to successful learners' academic performance. According to Kalayci and Oz (2018) parents or other caregivers are the first teachers of children and this role continues even when they start school. In addition, parents need to become collaborative partners with teachers in order to provide an environment that assists their children's performance at school. However, findings of their studies reveal that some parents argue that their involvement does not create a significant difference on their children's Biology development.

According to Lara and Saracostti (2019) majority of the parents are uneducated and unfamiliar with the syllabus of Biology as a science subject. It is therefore difficult for them to participate in a way that is required by the teachers. However, being involved in their children's learning is considered crucial and influential in the learners' performance. Parental involvement plays a vital role in a learners' academic performance (Channon, Smith, Head, Macrae, & Chasakara, 2020). Irrespective of ethnicity, research has shown that parental monitoring leads to higher academic achievement due to the fact that parental attention help learners remain focused at school (Lara & Saracostti, 2019).

Based on the results of his studies Badugela, (2019) found that, parental involvement is positively related to expectations of learners having a high positive attitude towards education, thus making learners more likely to excel. Approximately 90% of learners are unable to get assistance from their parents in Biology (Lara & Saracostti, 2019). They defined parental involvement as limited and because most of the parents are uneducated, cannot read and write, and they do not even understand their role in their children's education. Martinez (2021) further argues that lack of parents' participation in schools hinders performance.

On the same note, Knapp (2016) argues that Biology teachers cannot do their work effectively without the support of parents. Knapp (2016) further notes that parents need to know what is happening in Biology classrooms in order to support the schools, because increased parental involvement will help remedy the problem of poor academic performance in schools.

Ebuta, Catherine and Ekpo (2014) conducted a research study in Nigeria which explored the influence of parental involvement on their children's education and their academic achievement in Biology. The result of the study revealed a significant positive relationship between parental involvement in their children's education and learners' academic achievement in Biology. Based on that, it was concluded that for learners' academic achievement in Biology to be effectively enhanced, parents should be interested and work with their children in their education. This will complement the teachers' effort to improve learners' academic achievement in Biology (Ebuta, Catherine & Ekpo,2014).

On the contrary, Sibomana, Karegeya and Sentongo (2021) argue that, in Rwanda, parental involvement may not lead to the attainment of improved performance in Biology because it has been noted that the classroom is almost the only setting where learners are exposed to Biology, and teachers are almost the only model and source of input for learners. However, in a study that was conducted in Nigeria, Ebuta, Catherine and Ekpo (2014) maintains that parents need to become more involved in helping their children to improve their schoolwork, providing encouragement, arranging for appropriate study time and space, modelling desired behaviour such as reading for pleasure, monitoring homework, and actively tutoring their children at home. According to Nkandi (2015) in Namibia, no clear documentation exist of how parental involvement can be promoted in rural schools and among parents living in high risk communities. Research results of his study point out that parental involvement is difficult to carry out in Namibia's rural schools and among parents from poor communities. In his study, Badugela (2019) posits that parents' involvement in the children's education is multi-dimensional, it can range

from parents directly helping their children with Biology homework to parents establishing high expectations for their children's Biology learning in schools.

Nkandi (2015) furthermore notes that the quality of parental involvement in the education of their children is an important factor when determining the children's performance in Biology. This is consistent with the observation by Lara and Saracostti (2019) that parental involvement is rooted in the belief that in order for schools to educate all children effectively, parents and families should become fully involvement in the process.

2.5.4 Teacher and learner motivation

Channon et al.(2020) regarded motivation as an important factor in learning science subjects. According to Othman and Shaqair (2020), motivation is one of the primary forces influencing the teaching and learning of Biology as a science subject. Othman and Shaqair (2020) claims that motivation has been broadly recognised as a major aspect which determines the success and level of science learning. They regard motivation as one of the primary components that contribute to participation in Biology as it influences the level of dynamic and personal engagement in the entire teaching and learning process of Biology.

In a study that explored the impact of motivation in Biology as a science subject in Iran, Alizadeh (2016) asserts that teachers can play a significant role in motivating learners to learn Biology, for them to perform well. Alizadeh (2016) highlights that learners become motivated to learn when they see themselves as capable individuals and use educational materials suited to their level. Learners are further motivated when they live in a safe environment and can express their psychological needs for achievement and recognition.

If learners are well motivated, they recognize that learning benefits them directly and have the freedom to make choices, take responsibilities for their learning, and experience more successes than failures.

Likewise, Abramo et al.(2019) express that motivated learners are enthusiastic, eager to work hard, concentrate on the tasks given, do not require constant encouragement, willingly to confront challenges, and could even motivate others through collaborative learning. In their research study, Sibomana et.al (2021) establishes that there is no doubt that motivation plays an important role in learners' good performance in subjects. Kayombo (2017) goes as far as suggesting that, without motivation, even gifted individuals may not be successful in the long run, no matter how good the curricula and the teachers are.

Chirimbana & Haimbangu (2018) argue that poor performance by Biology learners is often caused by Biology teachers' lack of motivation. A study that was carried out in Namibia, Nkandi (2015) suggests that motivation determines attitudes towards learning while, on the other hand, the attitudes that one has towards the target subject influences the extent to which they are motivated to teach and learn Biology.

Nkandi (2015) further implies that good learner performance in Biology examinations cannot be considered without motivated to learning. Similarly, Simasiku (2017) posit that teachers' motivation towards Biology create positive attitudes and enthusiasm in learners towards Biology. Subsequently, motivation makes learners perform better in Biology, as it opens the minds and expands learners' knowledge to explore new ideas and achieve their success.

Along the same line, Simasiku (2017) indicates that if a school is to improve learners' and teachers' performance in Biology examinations, then attention should be given to their level of motivation and the support they receive. He further notes that motivated learners are higher achievers than unmotivated ones. In the light of the above arguments, it could be argued that poor motivation of Biology teachers and learners leads to poor commitment and as a result, learners end up performing poor in Biology. Therefore, Biology teachers might need to develop means and methods that motivates learners to learn Biology.

2.5.5 Administrative and management support

According to research study conducted by Carl (2019), administrative and management support is one of the most important component in an education system for teachers to succeed and develop new ideas for the new curriculum implementation. School administrators are responsible for both teaching the teachers and learners to work better and succeed (Chirimbana & Haimbangu, 2018).

Chirimbana and Haimbangu (2018) further stated that one of the duties of the school administrator and manager is to monitor the learners' success and making teachers understand what they can do to improve their learners' performance. They further stated that school administrators communicate with parents about their children's performance because at many a times, parents may not know about how their children are progressing at school. Although there are many distinct kinds of areas of support, the literature prioritises administrative and management support as the best support for effective implementation of any new curriculum (Amukugo, 2021). The support is offered through various professional development opportunities and Professional Learning Communities

(PLCs), which are intended to address any issues that might impede the successful implementation of a change (Amukugo, 2018).

Recent research have demonstrated that whether or not teachers feel supported in implementing the new curriculum, still the implementation of a new curriculum depends on administrative support and management support (Carl, 2019).

2.5.6 Teacher support

Channon, Smith, Head, Macrae and Chasakara (2020) found that when a new program needs to be implemented, educators require guidance and support to implement such new program. Teachers cannot implement a curriculum effectively if they are not given supports on how to implement such curriculum. Channon et al., (2020) suggests that training and professional development that includes both introductory and advanced training on curriculum must be introduced to teachers. They further stated that, teachers implement any curriculum effectively when they are given trainings on how to implement such curriculum.

On the other hand, Anderson and Elloumi (2017) suggest that ongoing feedback to teachers about their use of the curriculum support learners through practice based coaching. Onuka (2018) discovered the necessity of teachers support in carrying out curricula objectives that are more effectively to the implementation of a curriculum. He further stated that teachers are more able to create learning tasks that are in line with curriculum goals while also being developmentally appropriate, if they are given support. Uka (2018), suggest that teachers are the implementers of the curriculum, therefore they should be given support in all circumstances to implement such curriculum effectively.

Teachers' support is important because it enables teachers to use teaching strategies and get teaching resources that are appropriate to the curriculum being implemented (Davis, 2018).

Davis (2018) asserts that effective teachers support give teachers opportunities to apply new knowledge and skills in their everyday work, for them to be able to deliver quality teaching to the learners which also results in effective curriculum implementation. Davis (2018), furthermore stated that if teachers are supported, they are more likely to create teaching and learning materials that are in line with the curriculum objectives. Moreover, Amukugo (2021) adds that it's through teachers support that teachers are able to find curriculum resources and technologies to connect their learners with the source of information and knowledge that allow learners to explore new ideas and acquire information and solve problems.

Alderman (2016) added that if teachers are asked to implement a new curriculum, they should be provided with ongoing In-Service Training to deal with the problems and difficulties encountered during the implementation process. Similarly, Chirimbana and Haimbangu (2018) found that the purpose of teachers' training especially in science subjects such as Biology necessitates a focus on teaching learners how to best interpret the curriculum so that their needs are aligned with appropriate instructional practices. Effective curriculum delivery is a principal indicator of quality basic education and teachers are the vehicles through which the curriculum is to be delivered, hence support should be rendered to teachers (Chirimbana & Haimbangu, 2018).

2.5.7 Teacher learner relationships

Amukugo (2021) defines teacher-learner relationship as a positive relationship between the teacher and the learner in efforts to gain trust and respect from each other. Having a positive relationship with the learners help learners to become more successful in the classrooms as well as makes the classrooms a safe and welcoming environment for all the learners (Amukugo, 2021).

Building a positive relationship with your learners is an excellent way to combat chronic absenteeism and learners are more motivated to attend classes when they know their teachers cares for them and helps them to succeed in their lives (Alderman, 2016). According Channon et al., (2020), positive personal relationship with the learners can also raise their intrinsic motivation to learn and when learners feel interested in their own work, they develop love of learning that benefits them for their entire lives. Channon et al., (2020) further stated that positive teacher - learner relationship help learners to learn how to evaluate and manage their behaviour which in turn makes them to reach their academic goals and over time, this can strengthen their academic achievements.

Carlson (2018) found that learners who have poor relationships with their teachers tend to perform poor in their academic achievements. He further noted that poor teacher-learner relationship has a negative impact on the implementation of a curriculum because teachers cannot deliver effective teaching to their learners if they have poor relationships with their learners. In same line, Chirimbana and Haimbangu (2018) posit that teachers and parents should understand that problematic bond is one of the factor that can contribute to poor learners' academic learning performance and educational growth.

Carlson (2018) urges teachers to have positive relationships with their learners because positive teacher-learner relationships alone does not translate to academic success, but learners that establish a strong bond with their teachers do perform better than learners whose relationships with teachers involve some sort of conflict, which in the end has an impact on the implementation of a curriculum.

2.6 Summary

This study's literature analysis uncovered teachers' experiences in the implementation of the Biology revised education curriculum. It also looked at the teachers' roles and responsibilities in the implementation of the revised curriculum and concluded with the potential strategies on how the implementation of revised Biology curriculum can be enhanced. In light with this, literature shows that teachers have many obstacles, which prevent them from fulfilling their primary responsibilities to their learners. The next chapter presents the research methodology of the research. It discusses the research design, population of the study, sample and sampling procedures, research instruments, data collection procedures, data analysis and research ethics.

CHAPTER 3: RESEARCH METHODOLOGY

3.1. Introduction

Carlson (2018) defined research methodology as a systematic, theoretical analysis of the method applied to a field of study. It comprises of the theoretical analysis of the body of methods and principles associated with a branch of knowledge. In general, research methodology is the research strategy that outlines the way in which research is to be conducted and among others, identifies methods to be employed (Carlson, 2018).

This chapter focuses on the methods and procedures which were used to collect data for the study by looking at the research design, population of participants in the study, sample and sampling techniques as well as the research instruments. It also discusses the data collection procedures and data analysis used.

3.2. Research design

The research design is the plan for collecting, measuring, and analysing data (Albert, 2021). It's the overarching strategy that the researcher choose to ensure that the study's various parts work together in order to answer the research questions. In order to gain an in depth understanding of teachers' experiences and roles and responsibilities in the implementation of the revised Biology curriculum of Secondary schools in Ompundja Circuit in the Oshana Region in Namibia, the study employed a descriptive case study design. According to Albert (2021), descriptive case studies are those that have a specific occurrence and examine in great depth, making participants framing their initial hypotheses and research objectives in clear, specific language.

He further stated that descriptive case study design is an empirical inquiry that investigates the cotemporary situation within its real life context when the boundary between the situation and context are not clearly evident and there are multiple sources of evidence being used. In this research study, the descriptive case study investigated the real-life phenomenon of the teachers' experiences and roles and responsibilities in the implementation of revised Biology curriculum. In addition, Fox and Bayat, (2020) stated that case study research is a methodology which involves either a qualitative or quantitative approach. In this case, a qualitative approach to the case study was employed in order to investigate the teachers 'experiences and roles and responsibilities in the implementation of the Biology revised curriculum in the Ompundja Circuit, Oshana Region, Namibia.

Fox and Bayat, (2020) defined a qualitative study as an inquiry process which seek to understand the humans' problems based on their real-life situations. He further stated that through using qualitative approach, the researcher attempt to collect rich descriptive data in respect of a particular phenomenon with the intention of developing an understanding of what is being observed and studied. It therefore focuses on the views and understanding of individuals and groups regarding the world and how to construct meaning out of experiences.

In this research study, the researcher decided to employ a qualitative approach because it provided a better understanding in depth on the topic at hand, by examining the teachers' experiences and roles and responsibilities in the implementation of the Biology revised curriculum. Furthermore, qualitative approach was therefore an appropriate approach for

this study as it enabled the researcher to determine the teachers' experiences and roles and responsibilities in the implementation of the Biology revised curriculum.

3.3 Population of the study

According to Johnson and Christensen (2020), population refers to the large group to which a researcher wants to generalize the sample results from the total group that the researcher is interested in learning more about. Mitchell and Jolley (2019) define population as a complete set of people with specialised sets of characteristics; it's an entire group about which some information is required to be ascertained. The population of this study constituted of all Biology teachers teaching in the Secondary schools of Ompundja Circuit in the Oshana Region, Namibia.

3.4. Sample and sampling technique

A sample refers to the number of individuals, items or events selected from a population in such a way that they are characteristically representative of that population (Somekh & Lewin, 2018). This research study made use of a purposive sampling technique to select the participants. According to Alderman (2016), purposive sampling is defined as deliberately selecting particular persons, events or settings for the important information they provide.

A sample of fifteen teachers were purposively selected from five (5) Secondary schools in Ompundja Circuit to participate in this study. The selection of schools was based on their distances from the place of the researcher. Teachers, on the other hand, were selected on the basis of their availability, experience, subject taught and positions they held at their schools. Thus, this sampling technique was essential since the participants possessed

appropriate levels of understanding and knowledge about the subject being studied, as they have the lived experiences.

3.5 Research Instruments

Many scholars have argued that qualitative research approaches understand the human experiences in specific settings holistically. Kruss (2016), for example mention that qualitative research is an interdisciplinary field which encompasses a wide range of epistemological viewpoints, research methods and interpretive techniques of understanding human experiences. The study used the semi-structured face to face interview schedules as a research instrument, as they are advantageous in that, they have the capacity to acquire a large number of relevant data. The researcher used a voice recorder and notebook to record and jot down participants' responses. The oral interviews were recorded with the voice recorder in order to capture all the rich information from the purposefully selected participants.

3.6 Data Collection Procedures

After obtaining authorisation from the relevant offices and institutions (i.e. The University of Namibia Ethics Committee, the Executive Director of the Ministry of Education, Arts and Culture, Regional Director of Oshana Educational Region and principals of participating schools), the researcher physically went to the schools of the selected participants for data collection (see Appendices A, B, C,). At the schools, the researcher then made an appointment with all the participants and conducted a one-hour interview session with each participant at a venue of their choices. All responses were recorded by a recording device. Furthermore, an in-depth face to face interview was used to get information from the Biology teachers.

The significance of one-on-one interviews is that it allows the researcher to ask in-depth questions while simultaneously enabling the participants to explain further and go beyond the initial question. An in-depth face to face interview was done individually and in the same manner with every participant until the data collection was completed.

The interviews lasted approximately one hour and were carried out in the participants' own settings to avoid disruption of daily activities. The interviews were recorded with a voice recorder and were put on paper after interview for transcribing purpose. The researcher asked for permission from the participants to be voice recorded with the assurance of confidentiality.

3.7 Data analysis

The collected data was analysed qualitatively and was transcribed and coded for themes identification and analysis. Data analysis is an essential part of the research study. Baker (2019) states that data analysis is all about making a series of deliberate, critical choices about the meanings and values of the data gathered and make justified decisions in terms of research.

Since, the data collected from qualitative research are often produced in bulk amounts, it is vital to shrink it to a convenient amount. Patterns, similarities and differences were discovered to determine the themes and sub-themes. The researcher listened to the audio clips and read the notes taken during the interviews. The study used the thematic analysis model to determine the themes and sub-themes to analyse patterns, similarities and

differences discovered in the study. Thematic analysis model allowed flexibility in interpreting the data and examining the perspectives of different research participants.

3.8 Research Ethics

The University of Namibia's Research Ethics Committee (UREC) issued the required ethical clearance to carry out the study (see Appendix A). In compliance with research ethical protocols, the researcher grouped the participants at their respective schools, and explained to them the purpose and procedures of the study as well as the ways in which their contributions or information would be utilised.

Before conducting the interviews, participants were given informed consent letters to sign (see Appendix E). They were furthermore informed that participation in the study was voluntary and that they were free to withdraw from the process at any time. Finally, participants' right to anonymity were assured and the data they provided would be treated as highly confidential and voice recordings will be destroyed after 5 years.

3.9 Summary

This chapter presented the methods and procedures that were used to collect data of the study. The chapter did so by looking at the research design, population of the study, sample and sampling procedures, research instruments, data collection procedures, data analysis as well as ethical consideration. The next chapter (Chapter 4) focuses on the presentation of results.

CHAPTER 4: PRESENTATION OF RESULTS

4.1. Introduction

This chapter focuses on the presentation of results regarding the teachers' experiences and roles and responsibilities in the implementation of the Biology revised curriculum in the Ompundja Circuit, Oshana Region, Namibia. The data presented here derive from fifteen (15) Biology teachers from the five (5) selected Secondary schools in the Ompundja Circuit, Oshana Region, Namibia. Responses from all interviews were analysed together to gather the same information. The data presentation and analysis were done according to the themes and sub-themes emanated from the data collected. These themes and sub-themes have been utilised in most instances to form the headings and present the responses of the participants.

4.2 Biographical information of the participants

In order to give the reader a clear picture of the study's participants and their characteristics and perspectives, their biographies are included in this section. Fifteen Biology teachers participated for the study from the five selected Secondary schools. As illustrated below, participants were numbered from 1 to 15.

Table 1: Biographical information of the participants

Participants	Position	Area of specialization + subjects taught	Gender	Teaching experience	Highest qualificati
1	HOD	**Biology and Physics:** Biology	Male	10yrs, 3 months	Degree
2	Teacher	**Environmental education + Natural sciences:** Biology and Life Science	Male	30 yrs, 2 months	Degree
3	Teacher	**Biology and Mathematics:** Biology and Mathematics	Female	16 yrs, 3 months	Degree
4	Teacher	**Biology and Physical Education:** Biology and Oshindonga	Male	1yr, 3 months	Degree
5	Teacher	**Integrated Natural Science:** Biology and Life Science	Female	13yrs, 4 months	Degree
6	Teacher	**Biology and English:** Biology and English	Male	16yrs, 4 months	Degree
7	Teacher	**Biology and Math:** Biology and Math	Male	15yrs, 2 months	Degree
8	Teacher	**Biology and Home Economics:** Biology	Female	2 yrs, 3 months	Degree
9	HOD	**Biology and English:** Biology and English	Female	16yrs, 1 month	Degree
10	HOD	**Biology and mathematics:** Biology and mathematics	Female	11yrs' 1 month	Degree
11	HOD	**Biology and Home Economics:** Biology and Home Economics	Female	10yrs, 5 months	Degree
12	HOD	**Biology and English:** Biology and English	Male	14yrs, 5 months	Degree
13	Teacher	**Biology and Physics:** Biology	Female	9yrs, 2 months	Degree
14	Teacher	**Biology and English:** Biology	Male	6yrs, 3 months	Degree
15	Teacher	**Biology and Mathematics:** Biology and Mathematics	Male	8yrs, 5 months	Degree

According to the data, all participants had degrees. Participants' teaching years of experiences ranged from one to thirty years. Ten of the teachers had more than ten years of experience, while only five had less than ten years of experience. There were ten classroom teachers and five Heads of Departments that took part in the research.

Heads of Departments that teaches Biology and Biology teachers from five selected different Secondary schools participated. From the above table, the researcher noted that all participants interviewed in Table 1 are all qualified Biology teachers in the Secondary phase and have at least working experience of more than a year hence experienced personnel were consulted.

4.3 Presentation of research data

Data presentation is the process of using different graphical representations to display the relationship between two or more data sets so that a decision can be made in light of them (Baker,2019). Presentation of research data was done according to the themes and sub-themes emanated from the data collected. The methods utilised to find the themes were data familiarisation, data coding, theme development, theme evaluation, definition and identification of themes, and finally writing up the themes. The information was then arranged into themes, including transcribed responses from the respondents to support the themes.

At the Namibian Secondary schools' level in Ompundja Circuit, Oshana Region, the data gathered from the interviews are presented in the form of discussions. This is meant to show the different perspectives the participants have experienced during the implementation of the revised Biology curriculum. The data were analysed thematically and presented in themes and sub-themes that were in line with the study's research goals because the study used a qualitative methodology and apart from that, individual in-depth face-to-face interview data was recorded, then analysed.

Findings and analysing patterns of meanings in qualitative data is done via thematic analysis (Chirimbana, Miranda, & Nakashole, 2020). The information was then organised into themes, with recorded comments from the respondents. Table 2 lists the themes and sub-themes that arose from the studied, transcribed, and collected data.

Table 2: Themes and Sub-themes

THEMES	SUB-THEMES
4.4 Theme 1: The teachers' experiences	**Sub-theme 4.1. 1** Inadequate resources
	Sub-theme 4.4.2 Medium of instruction
	Sub theme 4.4.3 Inadequate time for content
	Sub theme 4.4.4 Overcrowded classes
	Sub theme 4.4.5 Lack of parental involvement
4.5 Theme 2: The roles of teachers and responsibilities	**Sub-theme 4.5.1** Motivation of learners
	Sub-theme 4.5.2 Learner assessor
	Sub-theme 4.5.3 Planner for the subject content
	Subtheme 4.5.4 Developer of teaching resources
	Sub-theme 4.5.5 Creator of a positive learning environment
	Sub-theme 4.5.6 Engages of learners in extra mural activities
4.6 Theme 3: Strategies to enhance the revised curriculum implementation	**Sub-theme 4.6.1** Design educational policies
	Sub-theme 4.6.2 Provision of adequate Biology classrooms
	Sub-theme 4.6.3 Remedial Biology classes
	Sub-theme 4.6.4 Formulation and implementation of policies
	Sub-theme 4.6.5 Provision of adequate educational infrastructures
	Sub-theme 4.6.6 Policies that engage the involvement of parents
	Sub-theme 4.6.7 Motivation teachers and learners

4.4 Theme 1: The teachers' experiences

The aim of the first objective of the study was to explore the teachers' experiences in implementing the revised Biology curriculum. Many teachers had different experiences, with some noting adverse shortages in teaching and learning materials, medium of instruction, inadequate time for content, and overcrowded classes. As generally indicated by most of the participants from all the schools, teachers' experiences are discussed more broadly under the sub-themes below.

4.4.1 Sub- theme: Inadequate resources

The researcher enquired about their experiences on syllabus content for the implementation of the revised Biology curriculum. One of the participants responded as follows.

" The syllabus content is too much and is very difficult for someone to complete it on time as we do not have enough resources such as textbooks for Biology for our learners to study and do further research, except the notes that we give them" (HOD 9).

This was echoed to by teacher 5 who also said that *"We have lack of sufficient Biology text books for the revised curriculum at our school".* The same sentiments were also supported by HOD 12 who also said that, *"The syllabus' content is too much and our classrooms are not enough to accommodate the number of learners we have at school, so the size of classes is really a concern at this school and is hindering the implementation of this revised curriculum".*

Another citation from the participants is that: *"We only have textbooks available for the Biology teacher for now and laboratories' equipment are not enough especially the ones for conducting practical '' (Teacher 2).*

Another participant, HOD 1 also said that *"The content for the syllabus is too much and lack of resources makes it difficult for teachers to complete the syllabus on time because learners are sharing resources such as textbooks."*

Some of the participants in the study stated that they need textbooks and laboratory and laboratory equipment for Biology in the circuit. To support the statement above, here are a few verbatim responses:

"*The syllabus' content is too huge and too complicated and school does not have a Biology room which is meant to teach Biology only and as a result, this makes it difficult to do practical which are part of the syllabus' content''(Teacher 8).*

This was also mentioned by teacher 7 when he said that, *"The syllabus' content is too much to be completed in two terms and one thing which is troubling us is that, we do not have enough learning materials such as textbooks which are required in the teaching and learning of Biology." (Teacher 7).*

HOD 10 also supported the idea by saying that *"Topics are too lengthy to complete in a given- time frame work and there is only one Biology teacher at the school. On the other hand, the school is in need of new curriculum textbooks as most of the previously provided textbooks are outdated".*

Resources provisioning are an essential component of any working environment and most participants in the study indicated that they do not have enough resources to use in schools. The shortage of teachers in schools was also an issue as one of the participants indicated that the school only had one Biology teacher with a teaching degree. This indicates that a shortage of teachers and the lack of learning and teaching support materials were an issue in the implementation of the Biology revised curriculum. The researcher noted that the absence of enough teaching time and assistive materials, such as textbooks for learners, posed a serious challenge for effective teaching and learning of Biology.

As indicated by the participants' responses, most learners from all participating five schools were sharing textbooks. This greatly affected the teaching and learning, and hindered the successful implementation of the Biology revised curriculum.

4.4.2 Sub-theme : Medium of instruction

All the participants were also asked about their experiences to give their views on the recommended teaching methods and which sections of the revised Biology curriculum are easy to teach and which ones are difficult. The participants felt that there are no specific teaching methods given neither any easy or difficult to teach the topic, but what is troubling learners in Ompundja Circuit is that, they have a challenge with a current language medium of instruction because they prefer being taught in their own language (Oshiwambo). Here are some of their verbatim responses from participants.

Teacher 7 said that *"We do not really have specific recommended teaching methods that one has to use. In most cases, we tune to different teaching methods that suits or accommodate learners in your classrooms. With sections or topics in the syllabus, they are all fine to teach but most learners are struggling with the English language that*

teachers use. I encountered learners trying to explain to one another for them to understand the topic in their mother tongue, and hence indeed I do hereby proclaim that there is indeed a language barrier."

On this aspect, Teacher 8 had this to say, *"Every teacher has to use the methods that are accommodating learners in his or her classroom. With me, all sections are fine but the only thing which hindering the effective implementation of this revised Biology is the medium of instruction. When I am marking Biology, I encountered grammatical errors of which sometimes the answer can be correct except the English used."*

The issue of language used was also supported by Teacher 3 when she said that, *"When it comes to teaching methods, I do not have a problem because I just use methods that are accommodating all my learners in the classroom, because there are no recommended teaching methods that one has to use. The only problem I am encountering is the medium of instruction. English is a problem when it comes to implementing this revised curriculum, especially in some rural schools found in Ompundja, the pass rate in Oshikwanyama can be 100%, but with subjects that are taught in medium of instruction is another story."*

Teacher 6 echoed the same view as he said: *"All sections are fine to teach and there are no specific given teaching methods that one has to use. The only problem we have is that, a learner may have understood the content in the class, but when they get a similar question or scenario in the test with different words used, they are likely to fail, not because they do not know how to answer or approach the question, but because of the different words that were used."*

This indicates that poor curriculum implementation in Biology, is caused by English as a medium of instruction which is the mode of transport used to transmit the revised Biology curriculum to learners.

4.4.3 Sub-theme: Inadequate time for content

During the interviews, teachers were asked about their experiences regarding views on the amount teaching time for the revised Biology curriculum. Some of the participants in the study concurred that there is inadequate time for covering the required content.

The following citations from the participants supports the above claim: *"As Biology teachers, we try by all means to quickly teach and make sure that we finish the syllabus and make a quick revision before the exams, as learners will be assessed across the whole syllabus thus, this is affecting our learners' comprehension of Biology and hence they will not be able to master all the competencies." (Teacher 4).*

This was also echoed by teacher 7 when he said that, *"We are talking about grade 10 content moved to grade 9 as the new curriculum. This is one of the challenges because it requires different teaching methods, and most of our teachers were trained under the old curriculum. They aren't trained to teach the new curriculum at all ".* On this matter, HOD 11 had this to say, "*We are having a lot to deliver to the learners within each term due to the change in the curriculum and the term is very short".*

The results are showing that the content is too much to cover within the required time, hence time to master every competency is drastically reduced. This means that learners may not be able to master everything due to limited time. The Biology teachers interviewed also confirmed that due to teaching time which is less, it becomes a challenge

to implement the revised Biology curriculum, which in turn reduces the expected performance in Biology.

4.4.4 Sub-theme: Overcrowded classes

This sub-theme focused on presenting results regarding the overcrowded classes in the implementation of revised Biology curriculum. When participants were asked the same question on the amount of time allocated to teach the revised curriculum, they also brought in the issue of overcrowded classes. The teachers tends to have difficulty in dealing with large number of learners in classes. Verbatim responses to the sub-theme were analysed as follows.

Teacher 13 reported, "*We have larger number of learners in classes that are difficult to control and again at the same time, there is no enough time to help these learners, hence to master the content is automatically hindered''.*

These sentiments were supported by HOD 11 when he said that, *"The allocated time to teach this revised Biology curriculum is not enough because we have a large number of learners per class and as result, you will not get enough time to cover the whole syllabus because time allocated cannot allow you to finish".*

Teacher 15 also supported this when he said that: *"Time allocation to teach this revised Biology curriculum is not enough as we have high number of learners in classes and it's not easy to teach a high number of learners and give them enough attention especially in Biology.*

HOD 9 further added that, "*This time allocation is not enough at all. We have large number of learners in classes as well as many class groups to teach, it becomes difficult*

for the teacher to mark the learners' works in a reasonable time and give them feedback because time allocated is less and the content is too much".

The results shows that the operation of any school requires the availability of sufficient classes to accommodate learners. Many of the grade 10 classes in Ompundja Circuit are overcrowded and the teaching and learning environment of the schools visited is thus unconducive. The classes are overcrowded, with each class housing about 42 to 48 learners.

4.4.5 Sub-theme: Lack of parental involvement

Under this theme, different questions related to teachers' experiences regarding the implementation of the revised Biology curriculum were posed. Data gathered showed that although some parents are willing to help their children at home, it is a barrier since they themselves had no formal education and hence some do not even know what Biology is.

On this issue, this is what teacher 14 had to say, *"We have a problem of parents not attending parents' meetings. They do not understand their roles in their children's learning since most of them are uneducated and hence they do not attend meeting and cannot help their children in doing their school works and some still believe in their traditional house chores, thus, they do not give time for their children to study at home even during the exam".*

This was also synchronised by teacher 7 when he said that, *"Most of the parents do not attend school meetings, thus most of our learners only learn from other learners as they cannot be assisted at home because their parents cannot communicate in English and after school, learners have to finish the house chores and they do not get time to study.*

Most parents do not show up for school meetings, even if you keep on inviting them to come check or view books for their children".

On this note, HOD 1 also hinted that "*Some of our learners live with their grandparents who were taught in Afrikaans during the colonial time, thus they do not understand Biology to help the learners at home and they cannot attend to school meetings because they know they cannot help their children simply because all subjects are written in English except Oshiwambo, hence the reason".*

This is a clear indication that the majority of the parents are uneducated and unfamiliar with the Biology curriculum and do not attend parents' meetings. It is therefore difficult for them to participate in a way that is required by the teachers. However, being involved in their children's learning is considered crucial and influential in the learner's performance.

4.5 Theme 2: The roles and responsibilities of teachers

Participants were asked to indicate the roles and responsibilities that Biology teachers play in the implementation of the revised Biology curriculum. Their responses indicated several reasons such as teachers are motivators, learners' assessors, planners for the subject content, developers of activities and teaching materials, creators of a positive learning environment as well as engaging learners in extra mural activities.

4.5.1 Sub- theme: Motivation of learners

Under this sub-theme, all the participants were asked a follow-up question(s) related to the motivation as one of their role and responsibility in implementing the revised Biology

curriculum. The research findings show that teachers motivate their learners to learn by providing them with positive feedback, in order to develop competence.

In line with this sub-theme, Teacher 6 had this to say, *"Biology teachers are motivators and grammar correctors, so they motivate learners to practice and use Biology more often at school and eventually develop the love for Biology".*

This was also supported by Teacher 2 who explained that, *"Teachers motivate their learners to learn by providing them with positive feedback, in order to develop competence".* She, further, stated that, *"Providing feedback enables learners to gain control over their own learning and a sense of belief about their abilities. Teachers who provide feedback to learners about their efforts give them the idea that through hard work, they can achieve tasks and do well".*

The issue of motivation was supported by HOD 1 who said that, *"They motivate learners to actively participate in Biology lessons by making them to work in pairs or groups".*

He, further, stressed that *"Biology is best learned in collaboration and communication among learners, who can help each other while working on different tasks in the classroom".* Moreover, Teacher 8 expressed that *"The teacher's role in enhancing performance is to motivate learners to practice Biology and eventually develop the love for Biology".*

With regard to the above responses from participants, motivation is regarded as one of the primary components that contributes to well performance among the learners.

4.5.2 Sub- theme: Learners' assessor

The following citations from the participants in the study show how most Biology teachers feel about their role as assessors for learners during the teaching and learning of Biology.

Teacher 3 explained that, "*Biology teachers have a role of assessing learners formally and informally".* Similarly, Teacher 13 said that, "*Teachers enhance performance by ensuring that learners have achieved the required competencies in the syllabus. They prepare and assess activities that are in line with the competencies of that grade".*

Teacher 15 also stressed his opinions that, *"As teachers, we ensure that learners have achieved the required competencies of the syllabus and that all skills are equally taught and assessed. It is the teacher's role to make Biology as a subject more enjoyable and loved by learners. So, teachers are mediators between school and parents about learners' progress"*.

Sharing the same sentiment, HOD 9 said that "*teachers enhance the performance of learners through correction and giving feedback so that learners may also find ways to improve their performance".*

The findings from participants are showing that assessment in the learning process is a role and responsibility of the teacher in gathering information related to the learners' learning progress, in order to improve their process in teaching; hence it can improve the learners' performance.

4.5.3 Sub- theme: Planner for the subject content

During the interview, participants were asked about their roles and responsibilities on planning for the subject content. Their responses showed that Biology teachers plan

lessons that give learners the chance to contextually practice the Biology and also develop flexibility to meet the present needs of the learners. In agreement with the above, participants lamented on the role and responsibilities of Biology teachers as a subject planner as follows:

Teacher 4 expressed that Biology *teachers play a role of planning for the subject content to be covered and develop the materials to be used".* On the same note, HOD 12 echoed that *"teachers prepare lesson which helps them to know what they want their learners to achieve and also direct them on what to do and how best they may achieve their objectives.* Furthermore, Teacher 5 supported the role and responsibility of the teacher as a planner that, *"We plan lessons and through lesson planning, the teacher is able to meet learners' expectations and also focus more on the basic knowledge first before taking them towards the next step".*

Similarly, Teacher 14 also had to say this on the issues of planning that, *"In planning, we compile a lesson plan that server as a guide that a teacher uses every day to determine what learners will learn, how the lesson will be taught as well as how learning will be evaluated".* He, further, added that *"whether the Biology teacher is novice or experienced, there is always a need for a lesson plan because every group of learners comes with its own challenges".*

While Teacher 7 pointed out that, "*There is no way a teacher can teach without planning the lesson. Planning a lesson gives a teacher variety of teaching methods to meet different learners' needs."*

HOD 11 also echoed that, *"When teaching, we use lesson plans which enable teachers to function more effectively in the classrooms by giving a detailed outline that teachers adhere to during each class".* Teacher 7 further emphasized on the role and responsibility of planning that, *"a teacher who fails to prepare, prepares to fail. According to him, an organised teacher is always able to deliver the lesson within the given time frame".*

The above responses indicates that if teachers are well prepared for the lessons, the delivery of the lesson is done smoothly.

4.5.4 Sub- theme: Developer of activities and teaching materials

This sub-theme focused on presenting results regarding the developer of activities and teaching materials as it is part of their roles and responsibilities. The verbal responses regarding developing activities and teaching materials are presented below.

HOD 10 pointed out that, "*I believe that learners learn best by looking at activities that have pictures when they are learning, therefore there is always a need for me to develop activities and teaching aids such as posters with pictures or sight words as well as bringing along concrete materials to the lesson*". Other reason given by Teacher 2 on the role and responsibility of developing activities and teaching materials was that, *"Developing activities and teaching materials are very important in the teaching and learning of* Biology*".*

Subsequently, Teacher 3 also added that, *Biology teachers develop enrichment activities for faster learners, and supportive materials for the slow ones.*

Teacher 4 expressed that, "*Biology teachers have to use materials to teach learners to read with understanding instead of memorising. Biology teachers correct learners and*

give them feedback that contributes to their language development and improved performance".

HOD 11 also elucidated that, *"It is the role of a Biology teacher to develop activities and teaching materials for his / her learners because learning materials makes the lesson interesting, learning becomes easier and enable the teacher to easily explain concepts to learners, thus enhances learners' achievement".*

Based on the researcher's life experience as a student and a teacher, the contribution of developing activities and teaching materials to the teaching process is manifold, and effective use of teaching and learning resources makes the process more attractive, interesting and modern, and, most importantly, it aids the learners in the processes of enhancing their intellectual and emotional capacities. The results of the research shows that teachers are positive in developing activities and teaching materials for effective teaching and learning for their learners.

4.5.5 Sub-theme: Creator of a positive learning environment

This sub-theme presented research results on creating a positive learning environment. The results shows that teachers are dedicated to create a positive learning environment for effective teaching and learning to take place. Teachers' verbatim responses regarding creating a positive learning environment are as follows:

Teacher 3 stated that, *"Biology teachers are creators of a positive learning environment where everyone is free to learn without any fear or intimidation".* Similarly, HOD 1 also said that, *"Biology teachers have a role for creating a positive environment in their classroom which allows learners to feel comfortable, safe and engaged".*

Another Teacher 15 said that, *"I believe that a teacher has a role of creating a positive environment for learners to learn as a team, celebrate each other's achievements and also learn from their mistakes.*

Put simply, participants feel that it is the role of a Biology teacher to make the classroom an environment where learners feel comfortable, where healthy relationships with peers and teachers flourish. In a positive learning environment, the process of learning becomes easier to adapt to and learners always look forward to participate in lessons freely.

4.5.6 Sub- theme: Engages learners in extra mural activities

From the interviews that were conducted, all participants acknowledged that their role and responsibility is to engage learners in extra mural activities. Here are participants' responses during the interviews.

Teacher 2 explained how Biology teachers engage learners into extra mural activities that, *"Biology teachers have a role to engage learners in debating clubs, quizzes, tests, spelling and reading competitions as well as helping them to model the language structures and rules".* Supporting the same view, Teacher 7 asserted that, *"most Biology teachers are role models as they should discuss Biology with their learners all the time. Biology teachers engage learners in activities such as debating club and quiz competition and reading competition that help learners to improve their speaking skills*."

Based on the interview responses, it shows that Biology teachers plays a number of roles and responsibilities in an education system such as motivating learners, assessing learners, planning lessons, developing activities and teaching materials, creating positive learning environment as well as engaging learners in extramural activities. In order to get an

excellent learning outcomes, the Biology teachers must perform all these duties within each single lesson.

4.6 Theme 3: Strategies to enhance the revised curriculum implementation

Under this section, participants were asked to give suggestions on how to enhance the teaching of the revised Biology curriculum and several solutions to the challenges have been highlighted under the following sub-themes below.

4.6.1 Sub-theme: Design educational policies

During the interviews, participants in the study indicated that the current policies do not seem to effectively improve provision of resources in schools, especially in schools that are in deep remote areas of Ompundja circuit.

Teacher 6 in the study had the following to say: *"The current policies don't seem to support and improve the provision of resources like library facilities and computer facilities in rural schools at all".* These sentiments were supported by HOD 10 who also said that, "*If only the government will be able to provide and monitor the provision of resources like textbooks, our learners do not have textbooks at all, especially for this new curriculum as the old textbooks are no longer useful, they are phased out. Imagine teaching Biology without any single textbook for the learners! We are not really having policies that seem to support this."*

4.6.2 Sub-theme: Provision of adequate Biology classrooms

After conducting interviews with participants, it shows that it is of utmost importance to provide adequate Biology classrooms for teaching and learning. With reference from the

results of the study, participants responded on the provision of adequate Biology classrooms as follows:

Teacher 4 responded as follows: *"If each school is provided with its own Biology laboratory and adequate equipment, the teaching and learning process will be highly improved and ultimately, improving learners' performance in Biology.*" This was echoed by HOD 1 who also said that, *"We need to have a Biology laboratory which is well furnished so that learners can be taught in conducive environments."*

Teacher 8 also added and said that, *"The provision of Biology classrooms laboratory will make Biology teaching and learning exciting and this will also improve the learners' perceptions and attitudes toward Biology."*

4.6.3 Sub-theme: Remedial Biology classes

With regards to remedial Biology classes, participants were positive and in support of remedial classes to enhance learning in Biology. The above statement is supported by views of different participants as follows:

The view of teacher 2: "*I think remedial classes for Biology lessons during study time would help our learners ".* These citations were echoed by Teacher 14 who also said that, *"School needs more of library facilities, so that they come up with a must-practical sessions every two weeks and this will also help learners to learn Biology.* On this issue, this is what HOD 11 had to say, "*Educational funds for educational travelling tours that helps and expose learners to different environments may help them to improve their Biology skills. ".*

Another participant also supported the idea by saying that, *"In the world of the digital age its paramount to have access to computers, for educational games, quizzes and biological games, and the use of biological around the globe, that's what our rural learners need to improve their skills, in Biology," (Teacher 15).*

These results are revealing that Biology remedial classes need to be introduce in order for revised Biology curriculum to be implemented effectively.

4.6.4 Sub-theme: Formulation and implementation of policies

With regards to the formulation and implementation of policies, participants were positive and in support with the formulation and implementation of policies that can improve leaners' Biology results. Here are the responses from the participants:

"*None of our teachers were trained to teach the revised curriculum, hence new policies need to be formulated to allow teachers to be trained on how to implement the revised curriculum as this has already a problem to our learners' performance in Biology," (HOD 1).*These citations were supported by Teacher 7 who indicated that, "*The new curriculum content is really a lot compared to the old one and time allocated to finish the content is inadequate. It also requires different pedagogical in teaching Biology, thus new policies should be formulated to allow teachers to implement this revised curriculum easily."*

On same issue, this is what HOD 11 had to say, "*In comparison with the previous notes from the old curriculum, there is an increase in the basic competences, thus the government need to formulate a policy that makes it easier for the teachers to implement this revised curriculum."*

As summarised from participants' conversations, it can be deduced that the formulation and implementation of policies will help in improving academic results for the learners in Biology.

4.6.5 Sub-theme: Provision of adequate educational infrastructures

The results on the provision of adequate educational infrastructures indicated that the available classes have not supported learning effectively since the number of learners keep increasing each year. Here are the responses from participants:

Teacher 2: *"Every year we have a large number of learners in each class and this year we are in short of chairs and tables. The schools need to come up with fundraising events for it to buy necessary teaching infrastructures".* This was supported by HOD 9 who said that, *"During winter the absenteeism rate increases, because some learners travel long distances in the cold weather to schools, because they do not have a hostel".* On this issue, this is what HOD 1 had to say, *"Sometimes the teacher will not finish marking a class activity within the lesson because learners are so many in a class and some make noise especially at the back."*

These findings show that substandard educational infrastructures continue to be a barrier to quality education and learners' performance in Biology and other Science subjects. The provision of adequate educational infrastructures will thus enhance high performance among Biology learners. The findings indicates that buildings are crucial elements of a conducive learning environment in schools.

4.6.6 Sub-theme: Policies that engage the involvement of parents

As reflected from interviews, the research participants indicated that parents are not involved in the education system and there are no policies making provision of involving parents in education. These were the participants' responses for recommendations to involve parents in their children's education:

Teacher 1 said *"Some parents do not show up during parents' meetings, they do not even know how their children are doing at schools, they do not even support their children in learning."* The above sentiment was supported by Teacher 4 when he said that, *"Some parents do not understand the importance of education, yet that is why sometimes they keep their children at home; missing the lessons, especially during the farming season and this contributes to poor performance."*

The same thoughts were supported by HOD 1 who so said that, *"There should be some educational programmes to include our dear parents into their children's school life."* Teacher 5 also shared her views on this issue by saying that, *"There must be educational rules that must involve parents in education. Furthermore, scheduling social evenings and invitations to social events like end-of-year celebrations can be used to force parents to take part in education of their children."*

These findings from the participants indicates that the issue of parental involvement plays a major role in influencing the children's education.

4.6.7 Sub-theme: Motivation of teachers and learners

The participants showed that teachers and learners are demotivated due to the lack of proper infrastructures such as roads and lack of facilities such as Biology study rooms. In short, here are the participants' responses:

"It's possible around here to advertise the teaching post, but even before the end of the term the qualified young teachers feel discouraged and get a transfer. This leaves our learners even being taught by three different Biology teachers in a year," (Teacher 8).

The same views and thought were shared by Teacher 6 who said that *"If the educational infrastructures are improved and provision is made, I believe it will motivate our teachers and even learners will be eager to explore the new ideas for example utilizing the Biology study rooms to solve biological problems together and learners' interest will be fostered".*

The same opinions were alluded to by Teacher 3 who also said that, "*If the government can increase the salary of Biology teachers in some remote areas, it will motivate and attract the effective qualified teachers," (Teacher 3).*

Based on the results, it is of the researcher's opinion that learners and teachers should be motivated to enhance teaching and learning of Biology. This can be an effective mechanism for a smooth implementation of a revised Biology curriculum.

4.7. Summary

This chapter presented the collected data under different themes. It looked at the biographical information of the participants, the teachers' experiences and roles and responsibilities of teachers in the implementation of the revised Biology curriculum. It

finally looked at the strategies to enhance the revised Biology curriculum. The next chapter (Chapter 5) focuses on discussion of the findings.

CHAPTER 5: DISCUSSION OF THE FINDINGS

5.1 Introduction

This chapter presents the results that were presented and interpreted in Chapter 4. It will relate the findings to the theoretical framework and literature review.

5.2 Linkage of the findings to the theoretical framework

The present study employed the Concerns-Based Adoption Model (CBAM) which is designed to assist researchers in determining exactly where a teacher is located with regards to his or her ability to implement a curriculum. The goal of this theory is to help educators better to describe, quantify, explain, and comprehend the transformation they undergo as they work to actualize the curricula content and pedagogical practices (Leedy & Ormorod, 2010).

This particular study explored Biology teachers' experiences and roles and responsibilities in implementing the revised Biology curriculum. The data collected indicate that all participants faced several challenges in implementing the revised Biology curriculum. Furthermore, factors such as the lack of teaching and learning resources, medium of instruction, inadequate time for syllabus content, overcrowding classes and lack of parental involvement, as well as motivation of teachers and learners towards the implementation of the Biology revised curriculum, hampered the successful implementation of the revised Biology curriculum.

This is in line with Joel and Ruhan (2016) who stated that for teachers to properly execute a changed curriculum and adjust to change, teachers require direction and support, which might be difficult to come by, during the innovations and implementation process. The

following aspects are of great significance in the implementation of the curriculum: physical resources, such as classrooms and textbooks (Cooney, Beckman, Lloyd, Wilson, & Zbiek, 2019).

This theoretical framework was employed to guide the study because it put much great emphasis on the effective implementation of the curriculum and took a closer look at factors that could hamper the effective implementation of the curriculum, thus providing the link to explore the teachers' experiences and roles and responsibilities in the implementation of the revised Biology curriculum in Ompundja Circuit, Oshana Region, Namibia.

5.3 Discussion of the results

5.3.1 Discussion of results related to teachers' experiences

The results stipulate the following: inadequate resources, medium of instruction, inadequate time for content, overcrowded classes and lack of parental involvement.

First and foremost, the findings of the study revealed that teachers experienced inadequate resources such as textbooks, human resources and Biology classes. The findings of the study uphold the earlier findings by a South African scholar (Carey, 2014) who indicated that rural schools need support from the government, especially financially to enhance a conducive teaching and learning environments and help to improve learners' performance.

The availability of resources in schools for Biology lessons is essential for the success of the subject. Learners must have textbooks available to them in order to engage in self-activities and self-learning (Carey, 2014). The findings also collaborate with the findings of (Orodho and Benjamin, 2021) who cited that, the learners do not have luxury resources

to enhance their learning at home and are therefore unable to improve their knowledge except when they are at school. This may lead to them losing interest in their schoolwork and then performing poor (Carey, 2014).

Supporting the findings of the study, The Ministry of Education, Arts and Culture Namibia (MoEAC) (2019) indicated that curriculum implementation is affected by poor infrastructure of the schools, especially in the north with few building structures at each schools, despite a large number of learners.

Furthermore, data gathered on the medium of instruction revealed that poor curriculum implementation in Biology is contributed by English language as a medium of instruction, which is the mode of transport used to transmit the revised Biology curriculum to learners.

The findings of the research support the study by Ajowi (2020) who claimed that there is a very strong link between the curricula or language of instruction and learners participatory in classrooms. The findings of the research also support the study by Albert (2021) who stated that, learners who are taught Biology curriculum in their local languages tend to perform poor than those that are taught Biology curriculum in the medium of instruction that is used to teach that particular subject.

The experiences of teachers regarding inadequate time to complete Biology syllabus content in the study concurred that there is an inadequate time for covering the required content. These findings concur with the earlier findings by Marsh (2019 who claims that lack of time affects teachers' capacity to finish tasks in many elements of their work, with some of the participants particularly saying that the teaching of Biology require more time unlike the teaching of other school subjects.

The data analysis of the research regarding the teachers' experiences on overcrowded classes indicated that teachers experienced problems with overcrowded Biology classes. They, furthermore, indicated that they have difficulty in dealing with large number of learners in classes. The findings above support and upholds the findings of research conducted by Mushtaq and Khan (2015) who reported in their study that teacher- pupil ratio has been found to be one of the strongest factor that makes learners perform well academically.

Mushtaq and Khan (2015) further indicated that, the fewer learners the teacher has, the more closely a teacher is capable of rendering supports to individual learner, and the more these learners are likely to perform well academically. A study by Adolphus (2020) noted that many learners in a class can lead to a chaotic classroom environment which is more difficult for the teacher to manage. He further stated that having many learners in class causes hindrance in teaching and learning process in implementing the revised Biology curriculum effectively.

In support of this, Emery (2020), stated that one of the most often mentioned problems encountered by Biology teachers is that "overcrowded classes, and this has an effect on teaching and learning process. Consequently, it is necessary that teaching and learning process requires comfortable and enjoyable atmosphere, otherwise, teachers might be in failure to fulfil learners' needs and achieve learning goals (Baker & Westrup, 2000). In Namibia, Nuuyoma (2020), conducted a study that looked at experiences of the Biology teachers in integrating Information Communication Technology (ICT) in the teaching of Biology. Most of the respondents from both rural and urban schools said that their classes had close to 45 learners, making it impossible to pay attention to all learners at once. The

fact that classes were overcrowded left very limited space where ICT facilities could be displayed in the classroom (Amukugo, 2021).

From the results presented in Chapter Four, numerous findings emerge. One of the most findings on teachers' experience regarding parental involvement in education indicated that parents are not involved in the education of their children as they are uneducated and have no clue of what Biology is.

The findings support the findings of Kalayci and Oz (2018) who stated that parents or other caregivers are the first teachers of children and this role continues even when they start school.

In addition, parents need to become collaborative partners with teachers in order to provide an environment that assists their children's performance at school.

The findings of the study supports the findings of Lara and Saracostti (2019) who stated that majority of the parents are uneducated and unfamiliar with the syllabus and Biology as a science subject. It is therefore difficult for them to participate in a way that is required by the teachers. However, being involved in their children's learning is considered crucial and influential in the learner's performance. Parental involvement plays a vital role in a learner's academic performance (Channon, Smith, Head, Macrae, & Chasakara, 2020).

Irrespective of ethnicity, research has shown that parental monitoring leads to higher academic achievement due to the fact that parental attention helps learners remain focused at school (Lara & Saracostti, 2019). The findings of the study are also supported by the findings of Badugela, (2019) who found that, parental involvement is positively related to

expectations and importance of schooling and by having a positive attitudes towards education, a learner is more likely to excel.

5.3.2. Discussion of findings related to roles and responsibilities of teachers

Participants were asked to indicate the roles and responsibilities of the Biology teachers in the implementation of the revised Biology curriculum and their responses indicated several roles and responsibilities such as teachers are motivators, learners assessors, planners for the subject content, developers of activities and teaching materials, creators of a positive learning environment as well as engaging learners in extra mural activities.

In the first instance, the research findings showed that teachers motivate their learners to learn by providing them with positive feedback, in order to develop competence. These findings concur with Adolphus (2020) who also notes that although learners are born with the natural ability to learn, much dependents on the teachers' involvement. Adolphus (2020) further mentions that sometimes, learners' energy, drive, and enthusiasm for a subject or task may wane and therefore require continued reinforcement through external support. The findings further supports the findings of Adolphus (2020) who conceptualises motivation as an innate desire that drives individuals to participate in an activity because of the satisfaction derived from it. Adolphus (2020) further states that another view of motivation suggests that it is a goal-directed learning, which stimulates and guides individuals toward a particular direction.

Furthermore, the findings of this study on teachers as assessors reflect that assessment in the learning process is a role of the teacher to gather information.

The findings concur with a study conducted by Sumardi (2017) who posit that most researchers have acknowledged that in the learning process, assessment is a role of the teacher to gather information related to the learners' learning progress in order to improve their process in teaching; hence it can improve the learners' performance. Other studies supporting the findings on the roles of teachers as assessors are research studies conducted in Turkey and Australia respectively, by Mellati & Khademi, (2018), who argues that assessment reveals how many learners have achieved the learning objectives in a particular subject content, how many have difficulties or problems with learning that particular subject content, and which techniques are useful in teaching that subject content.

In addition, assessment helps teachers to evaluate the strengths and weakness of learners and motivate them, and provides teachers with useful feedback about learners' subject content acquisition (Joel & Ruhan, 2016).

The findings also concur with Torto (2017), who stated that that continuous assessment is essential for the Biology teachers to judge learners' achievement and weaknesses in Biology.

The findings also concur with Sethusha (2018) who adduces that South Africa's Curriculum and Assessment Policy Statement (CAPS) requires teachers to use continuous assessment to identify, assess and provide learning support to learners who might experience barriers to learning and development. Moreover, teachers are expected to use both formal and informal assessments to ensure that assessment is accurate, objective and fair and has used clearly defined learning outcomes and assessment standards to plan for formal assessment tasks.

Participants in the present research study revealed that teachers have a role and responsibility of planning subject content to enhance teaching Biology. The findings align with Finlinson (2016) who explains that a teacher designs a detailed lesson plan based on specific lesson objectives stipulated in the syllabus, by preparing different types of activities that meets the needs of all learners. Through writing a lesson plan, teachers design the appropriate materials and provide instructional strategies needed for their learners. Teachers' participation in planning lessons makes it easier for them to set the appropriate time for how long each activity might take (Finlinson, 2016).

In his article that discussed the formulation of a lesson plan, Al-Zoubi (2018) states that the lesson objectives stipulated in the syllabus are specific knowledge or skills that learners should master by the end of the lesson or unit and this makes it easier for teachers to spot out what learners are expected to know at the end of the lesson or unit. He further posits that each day should have an overall purpose or goal that learners should be able to accomplish by the end of the class period. Additionally, Shikongo (2020) , explains that although it is the role and responsibility of the Biology teachers to carefully plan lessons that will give learners the chance to contextually practice the Biology, through lesson planning, teachers also develop flexibility to meet the present needs of the learners.

Sharing the same sentiment, the findings of the study are in line with the research project conducted in Ghana on the implementation of the basic curriculum for Biology by Torto (2017), who asserts that lesson plan is the initial teaching and learning material that is prepared to facilitate the teaching and the learning situation effectively. He, further, claims that for a teacher to implement a curriculum, his or her preparation for the lesson is very crucial. If the teacher does not prepare the lesson plan, their teaching becomes difficult

since the lesson preparation is a systematic guide as to how the teacher's lesson should unfold (Torto, 2017).

In another research study conducted by Bond (2017), it was found that those teachers who do not prepare their lesson due to various reasons, encountered challenges in the implementation of the Biology curriculum in Ghana. Closely linked to that, Manyarara (2015) in a study conducted in Zimbabwe argues that lesson planning assists teachers to achieve what they want and direct them on how to deliver the subject content to learners. Lesson plan assist teachers on actual teaching and help teachers to evaluate on how successful the lesson was. It is through lesson planning that teachers evaluate their weakness and strengthens and if there are weakness, the teacher has to re-teach that topic.

In Namibia, MoEAC (2019), The National Policy for Natural Science clearly states that written lesson preparation is compulsory for every teacher, irrespective of experiences. It further asserts that a successful lesson plan should include the date, time, theme and topic, teaching and learning materials, lesson objectives and basic competencies to be achieved.

Furthermore, the presentation part of the lesson plan should consist of the following: a short, appropriate introduction, monitoring of homework done, presentation of the subject content and a suitable conclusion (MoEAC, 2019). In addition, the policy emphasises that after lesson delivery, the teacher should write critical reflection on the lesson, noting how teaching strategies could be changed to meet the lesson objectives (MoEAC, 2019).

Besides that, Carlson (2018) also notes that if a teacher has well prepared for the lesson, the delivery of the lesson is done smoothly. She also argues that a well-prepared teacher will not get stuck in the middle of the lesson because the teacher knows how to manoeuvre

to get through the lesson. The above arguments seem to indicate that lesson planning serves as a useful tool for the Biology teachers in enhancing their learners' performance. Effective planning should also be reflected in every Biology teacher's classroom management (Brodier, 2019).

Participants in the present research study revealed that teachers develop teaching and learning resources to enhance teaching Biology as it is one of their roles and responsibilities in the teaching profession. The findings align with Khan, Salahudinn and Rahma (2020) who states that teaching and learning materials are very essential to motivate learners towards learning and to capture the content of Biology knowledge easily.

Khan et al. (2020) further acknowledge that a stimulating atmosphere for Biology teaching can be created by displaying posters, charts, maps, advertisements, timetables and signs together with works produced by the learners themselves in the classroom. In fact, teaching and learning materials that can be used in a Biology classroom are enormous and their use would be suitable and appropriate to the learners' needs (Alderman, 2016). Sharing the same sentiment, Küçükler and Kodal (2018) in their study conducted in Turkey stress that to ensure effective learning of Biology in classes, teaching and learning materials such as cards, posters, maps, and textbooks should be used.

The findings support the findings of Alderman (2016) who assume that electronic teaching and learning materials communicate better in Biology than using traditional teaching and learning materials. Bajrami and Ismaili (2016) posit that Biology teachers should use computers, note pads, projectors, and audio-visual tools to facilitate the

teaching process in order to enhance the performance of their learners in classrooms. Similarly, Archana and Rami (2019) points out that using the video materials in teaching Biology help learners to perform better. Besides that, using video materials enhances learners' attention span resulting in better retention of the Biology content (Alberto & Troutman, 2010).

In a South African context, Bester and Brand (2018) propound that although no technology is able to replace the role of the Biology teacher in the classroom, it can however be successfully integrated into lessons which could maximize the learning experience since technology is being becoming an integral part of the life world of today's learners. Assuredly, having brought up with technology, present day learners are more used to absorbing information from the screens than from the printed pages, and learners finds teachers who use technology to be more reliable and knowledgeable than those who do not (Bester & Brand, 2018).

In a study that investigated the teaching and learning materials availability and teachers' content delivery in Secondary schools in Rwanda, Orodho and Benjamin (2021) established that the challenges of unavailability and inadequacy of electronic teaching and learning materials was found to negatively affect teachers' effectiveness in the use of teaching methods as well as learners' attainment of good academic results in Biology.

Therefore , Orodho and Benjamin (2021) recommend that teachers should fulfill the needs of all learners by playing the role of the technology teaching and learning materials which are visually attractive and auditory stimulating.

The creating of a positive learning environment in the research study was found as a key aspect and crucial for Biology teachers in their classrooms. The findings are in line with De Nobile et al., (2017) who further stated that classroom management creates a positive learning environment for effective teaching and learning. Establishing a positive classroom climate is the key for helping all learners to achieve success. As De Nobile et al., (2017) further states that a teacher needs to manage his / her class in order to create a supportive environment that embraces diversity and culturally sensitive.

Put simply, participants feel that it is the role and responsibility of a Biology teacher to make the classroom an environment where learners feel comfortable, where healthy relationships with peers and teachers flourish. In a positive environment, the process of learning becomes easier to adapt to, and learners always look forward to participate in lessons freely.

The findings of the study revealed that all participants acknowledged that teachers play a role in creating a positive classroom environment which enhancing the performance of their learners. All Biology teachers purported that Biology teachers are mediators between the school and home, and they also create a positive learning environment for learners to learn.

The engagement of learners in extra mural activities in the research study was found as a key aspect and crucial for the implementation of revised Biology curriculum. The findings concurs with Anyiendah (2017) who claims that a teacher is an actor who plays a number of roles and responsibilities such as letting learners to participate in science fairs by giving learners some quizzes to do.

5.3.3. Discussion of findings on strategies to enhance the revised curriculum

In order for schools to remain relevant and productive, the highlighted contributing factors in this study to poor performance of learners in Biology need to be resolved using empirical solutions (Davis, 2018). If the highlighted contributing factors are resolved, not only will this help to improve the learners' performance in Biology, but it will also help to improve the educational performance of other educational stakeholders. Several solutions have been highlighted in this study and discussed, from designing educational policies, provision of adequate Biology classrooms, remedial Biology classes, formulation and implementation of policies, provision of adequate educational infrastructures, policies that engage the involvement of parents and motivation of teachers and learners.

The designing of educational policies was found not as an effective strategy to enhance the revised Biology curriculum implementation. Teachers, furthermore, indicated that the current policies do not seem to effectively improve provision of resources in schools, especially in deep remote areas schools of Ompundja circuit. The findings contradict Dzimiri and Marimo (2015) who stated that designing public policies that effectively improve the provision of resources in schools will help to mitigate lack and inadequate availability of resources such as textbooks and other teaching aids such as posters and charts.

There is no way that the goal and objectives of education can be achieved without putting in place some mechanisms in the school system. Part of the integral pre-requisites to be put in place toward the actualisation of the educational goal and objectives requires adequate provision of resources, maximum utilization and appropriate management of

educational resources to avoid wastage and to improve the quality of teaching and learning process (Dzimiri & Marimo, 2015).

Participants in the study recognised the need for provision of adequate Biology classrooms as a need or strategy to enhance the revised Biology curriculum implementation. They, furthermore, stated that they need to have Biology laboratories which are well furnished so that learners can be taught in conducive environments. These findings support the findings of Onuka (2018) who states that the Ministry of Education, Arts and Culture should outsource funds and partner with non - governments organisations in order to build sufficient classrooms which can accommodate all the learners in the schools. Subject specialists and advisors that are currently in district offices should be used as tutors and they should be stationed at the various set venues. This will cut the costs of purchasing science materials for individual schools and will also minimize the costs of building individual science laboratories in schools.

The present study established that remedial classes enhance teaching Biology in the Ompundja Circuit. This clearly shows that teachers in the Ompundja Circuit conducts remedial classes for Biology. This finding is similar to Brodier (2019) who asserted that through teachers training, teachers gain more knowledge and experiences, and are likely to conduct remedial Biology classes and this will assist learners to improve their Biology content, and at the same time it motivates learners to learn and explore Biology further.

This study found that the formulation and implementation of policies help to enhance the revised Biology curriculum implementation. The findings support the earlier findings of Emery (2020) who revealed that any curriculum changes should also involve changes in

teaching and learning methods in order to cope with newly introduced or transformed content.

The study discovered that many teachers had little mastery of subject matter required by changes in school curriculum, particularly to those who start to implement the changes for the first time.

The results on the provision of adequate educational infrastructures indicated that the available classes have not supported learning effectively since the number of learners keeps increasing each year. The findings, furthermore, showed that substandard educational infrastructures continue to be a barrier to quality education and learners' performance in Biology and other science subjects. The provision of inadequate infrastructures is a challenge and findings also indicates that buildings are crucial elements of a learning environment in schools.

This supports Abramo, Cicero, & D'Angelo (2019, p.67) findings, who suggested that "the government must also provide physical facilities such as classrooms, laboratories, workshops, and libraries in order to create a conducive environment for the curriculum implementation to take place". Workshops such as instructional materials and resources workshops, on curriculum implementation have a great influence on the implementation of the Biology curriculum (Abramo et al., 2019). During instructional materials and resources workshop, curriculum implementers select and use instructional materials and resources like textbooks, digital resources, audio visual and other teaching aids that support the curriculum.

The results on policies that engage the involvement of parents indicated that there are no policies that force parents to participate in the education of their children. The findings contradict Kalayci and Oz (2018) who stated that parents or other caregivers are the first teachers of children and this role continues even when they start school. In addition, parents need to become collaborative partners with teachers in order to provide an environment that assist their children's performance at school.

However, findings of their studies reveal that some parents argue that their involvement in education does not create a significant difference on their children's learning and development. Most importantly the policies must ensure that school curriculum, particularly in Biology must consider the availability of teaching and learning materials as well (Andrews & Taylor, 2018).

On motivation of teachers and learners, participants in the research study recognise the need for motivation of teachers and learners as a strategy to enhance the revised Biology curriculum implementation such as infrastructures. Participants, furthermore, indicated that lack of proper infrastructures such as roads is already a discouragement, as many young teachers are coming and going due to the lack of facilities such as Biology study rooms, libraries, computer laboratories, overcrowded classes, lack of textbooks, and lack of internet connection.

The findings of the present study align with Othman and Shaqair (2020) who stated that motivation is one of the primary forces influencing the teaching and learning of Biology as a science subject. They, further, claimed that motivation has been broadly recognised as a major aspect which determines the success and level of science learning. They regard

motivation as one of the primary components that contribute to Biology as a science subject. Motivation influences the level of dynamic and personal engagement in the entire teaching and learning process for Biology.

In the same vein is Alizadeh (2016) underscores that learners become motivated to learn when they perceive themselves as competent individuals. Learners are also motivated when they work with materials tailored to their level and can see clear goals in their activities. Additionally, their studies become more meaningful when they are presented with challenging tasks. Furthermore, learners' motivation is fostered when they live in a safe environment and have the opportunity to express their psychological needs for success, recognition, and acceptance.

Their intrinsic motivation is enhanced when they understand that learning is for their own benefit rather than solely for their teachers.

5.4. Summary

This chapter has discussed the findings that were presented and interpreted in Chapter 4. It also looked at the correlation between the findings with the theoretical framework and literature review of the study. The next chapter (Chapter 6) presents the conclusion and recommendations of the research study.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6. 1 Conclusion

Based on the findings, this study concludes that curriculum implementation is one of the difficult components encountered by Ompundja Circuit Secondary schools teachers. Despite various strategies employed by Ompundja Circuit teachers to implement the revised Biology curriculum, not all strategies are effective and these teachers still find it difficult to implement the revised Biology curriculum. The study infers that Biology teachers in Ompundja Circuit experiences various obstacles in implementing the revised Biology curriculum. Through their responses, it can be deduced that if the revised Biology curriculum is not well implemented, learning and teaching process will be hindered. Thus, at the end of the day, the objectives that had been set would not be achieved. It can also be concluded that ensuring that the Biology revised curriculum is well supported also eliminates poor performance among learners in Biology. In order to give a clear view on the implementation of the revised Biology curriculum in Ompundja Circuit, the researcher elaborated the recommendations of the study in conjunction with the three main questions of the study as follows:

Research Question 1: What are the teachers' experiences when implementing the Biology revised education curriculum in Ompundja Circuit?

The findings of the study shows that Secondary school Biology teachers in Ompundja Circuit faced different challenges in implementing the revised Biology curriculum. Some of the challenges mentioned by the participants were teachers and learners' lack of

motivation, overcrowded classes, and the absence of educational infrastructures like Biology study rooms, lack of teaching resources as well as lack of parental involvement.

Research Question 2: What are the roles and responsibilities of Secondary school teachers in the implementation of the Biology revised curriculum?

This study has revealed a variety of important roles and responsibilities that Biology teachers play in enhancing the implementation of the revised Biology curriculum. The study's findings in the Ompundja Circuit, in the implementation of the revised Biology curriculum revealed that Biology teachers actively promote the use of medium of instruction among learners in classroom settings and they use the medium of instruction interaction when collaborating on learners' tasks, either individually or in groups. These teachers also provide feedback, assess learners' performance, develop activities in line with grade-level competencies, plan their teaching strategies, and create instructional materials. The study, further, revealed that lesson planning gives teachers' guidance on how to accomplish their goals and makes it possible for them to satisfy the expectations of their learners as strongly mentioned in the study by participants. On the last note, the study also revealed that teachers in the Ompundja Circuit create a positive learning environment for stimulating teaching and learning.

Research Question 3: How can the implementation of the revised Biology curriculum be enhanced in Ompundja Circuit?

Participants were able to propose different strategies to ensure effective implementation of the revised Biology curriculum in Ompundja Circuit. The study suggested the provision of adequate Biology classrooms, remedial teaching of Biology or learning,

provision of adequate educational infrastructures, parental involvement as well as motivation of teachers and learners as some of the strategies that can be used to ensure effective implementation of the revised Biology curriculum in the Ompundja Circuit, Oshana Region, Namibia.

Furthermore, the study concluded that the current policies do not seem to effectively address the provision of resources and educational facilities, especially in schools located in the remote areas thus, these policies need to be amended to make sure that all schools receives resources and educational facilities in regardless where they are found. The study also concluded that the negative attitudes or perceptions towards Biology can be mitigated by motivating teachers and learners by meeting their educational needs, such as providing schools with Biology equipment, textbooks and a safe learning environment that is conducive and learner-centered.

6.2 Recommendations

The study recommends the followings under the following headings:

6.2.1 Recommendations for improvement

The study recommends initiating fundraising events in order to raise money for certain school needs, such as funding Biology laboratories equipment. Scheduling social evenings and invitations to social events like end-of-year celebrations was recommended in the study in order to increase parental participation in school management.

Additionally, the study recommends awarding of the best to inspire both teachers and learners to learn Biology. Furthermore, the study recommends a learner support team to

be established at each school in order to assist learners who might require individualised assistance or additional instruction.

All educational matters in the nation fall under the purview of the Ministry of Education, Arts, and Culture (MoEAC). As a result, the study recommends the MoEAC to create policies that oversee to and guarantee the availability of teaching materials like books, posters, and laboratories facilities at all schools, including urban and rural, and that they are dispersed fairly.

Moreover, the study recommends the MoEAC to ensure that every Secondary school must have a policy requirement for the provision of Biology resources, and regulations that oversee the administration of these Biology rooms at each individual school must be in place.

Furthermore, the study also recommends that before the revised curriculum is introduced, policies that assess and monitor it, are needed to make sure that teachers are properly prepared to teach it, that workshops are offered beforehand and that the subject can be covered in the allocated time. Additionally, the study recommends that the MoEAC must also make sure that enough teaching resources are available for the revised Biology curriculum's teaching and learning.

The provisions of adequate infrastructures for the schools, particularly classroom buildings that are up to code, enable a secure teaching and learning environment, and reduce overcrowding in the classrooms was recommended by the study. The Ministry of Education, Arts and Culture should make sure that parents are involved as an important educational stakeholders in implementing new policies.

The MoEAC should also encourage Biology teachers in remote areas with rewards like higher pay scales. In the final analysis of recommendations, the Ministry of Education, Arts and Culture should revisit the criteria that were used to allocate resources to schools so that the neediest schools are prioritized and the amount of funds to be in line with their needs in line with the teaching and implementation of the revised Biology curriculum.

6.2.2 Recommendations for further research

The study only focused on the experiences and roles of the Biology teachers in implementing the revised curriculum for the Namibian Secondary schools in Ompundja Circuit, Oshana Region. Therefore, further studies need to be undertaken in a similar phase and in other subjects as well as at different regions and circuits in Namibia, to compare these experiences and roles of teachers across all the other schools in Ompundja circuit.

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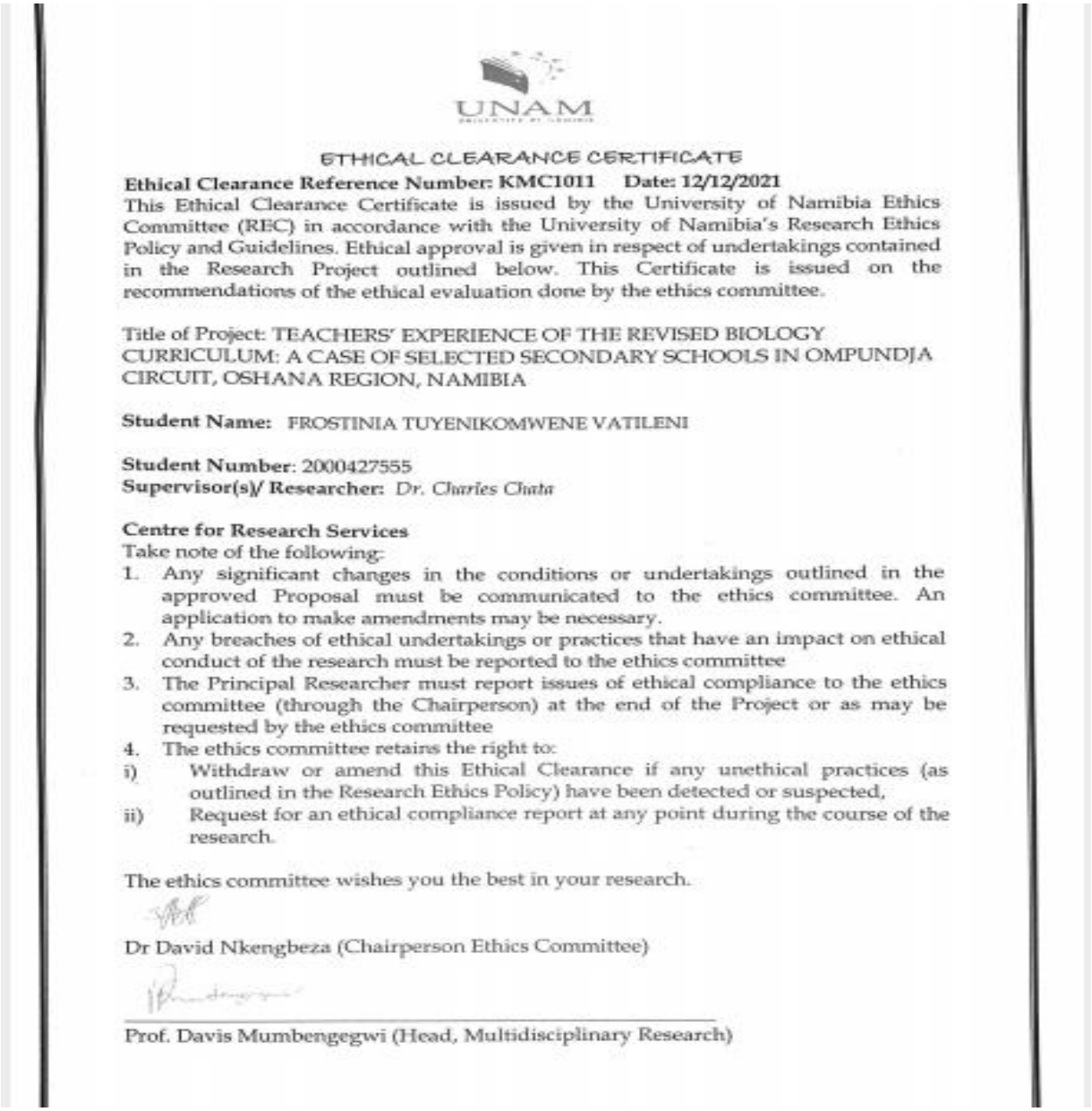
APPENDICES

Appendix A: Research Ethical Clearance Certificate



UNAM

ETHICAL CLEARANCE CERTIFICATE

Ethical Clearance Reference Number: KMC1011 Date: 12/12/2021

This Ethical Clearance Certificate is issued by the University of Namibia Ethics Committee (REC) in accordance with the University of Namibia's Research Ethics Policy and Guidelines. Ethical approval is given in respect of undertakings contained in the Research Project outlined below. This Certificate is issued on the recommendations of the ethical evaluation done by the ethics committee.

Title of Project: TEACHERS' EXPERIENCE OF THE REVISED BIOLOGY CURRICULUM: A CASE OF SELECTED SECONDARY SCHOOLS IN OMPUNDJA CIRCUIT, OSHANA REGION, NAMIBIA

Student Name: FROSTINIA TUYENIKOMWENE VATILENI

Student Number: 2000427555
Supervisor(s)/ Researcher: *Dr. Charles Chata*

Centre for Research Services
Take note of the following:

1. Any significant changes in the conditions or undertakings outlined in the approved Proposal must be communicated to the ethics committee. An application to make amendments may be necessary.
2. Any breaches of ethical undertakings or practices that have an impact on ethical conduct of the research must be reported to the ethics committee
3. The Principal Researcher must report issues of ethical compliance to the ethics committee (through the Chairperson) at the end of the Project or as may be requested by the ethics committee
4. The ethics committee retains the right to:

i) Withdraw or amend this Ethical Clearance if any unethical practices (as outlined in the Research Ethics Policy) have been detected or suspected,
ii) Request for an ethical compliance report at any point during the course of the research.

The ethics committee wishes you the best in your research.

Dr David Nkengbeza (Chairperson Ethics Committee)

Prof. Davis Mumbengegwi (Head, Multidisciplinary Research)

Appendix B: UNAM Research permission letter

Appendix C: Permission letter from Oshana Education Director

REPUBLIC OF NAMIBIA
OSHANA REGIONAL COUNCIL
DIRECTORATE OF EDUCATION, ARTS AND CULTURE
ASPIRING TO EXCELLENCE IN EDUCATION FOR ALL

Tel: 065 - 229800/25
Fax: 065 - 229834
Private Bag 5518
Oshakati

Enquiries: Hileni M Amukana
Ref. 13/2/9/1

Frostinia Vatileni
P.O. Box 2569
Oshakati

SUBJECT: PERMISSION TO CONDUCT A RESEARCH IN OSHANA REGION

Your letter dated 10 February 2022 on the above caption bears reference.

Kindly be informed that permission is hereby granted to conduct research study at Ekwafo Secondary School, Kapolo Secondary School, Mweshipandeka Secondary School, Gabriel Taapopi Secondary School and Ongwediva Secondary School in Ompundja Circuit, Oshana Region.

This permission is subject to the following strict conditions; **(i)** There should be minimal or no interruption on normal working schedule **(ii)** Ethical issues of confidentiality and anonymity should be respected and retained throughout this activity i.e. Voluntary participation, and consent from participants.

Both Parties should understand that this permission could be revoked without explanation at any time.

Furthermore, we humbly request you to share your research findings with the Directorate of Education, Arts and Culture, Oshana Region. You may contact Ms. Hilma Nuunyango-George, the Deputy Director; Programs and Quality Assurance (PQA) for the provision of summary of your research findings.

We wish you the best in conducting your study.

Yours sincerely,

HILENI M. AMUKANA
REGIONAL DIRECTOR

11. 02. 2022

OSHANA REGIONAL COUNCIL
DIRECTORATE OF EDUCATION, ARTS & CULTURE
OFFICE OF THE DIRECTOR
11 FEB 2022
Private Bag 5518
OSHAKATI
REPUBLIC OF NAMIBIA

Cc: Inspector of Education: Ompundja Circuit

All Official Correspondence must be addressed to the Regional Director

Appendix D: Research Instrument: Interview Guide

Introduction

My name is Frostinia Tuyenikomwene Vatileni. I am a student studying towards a Master's Education degree in Inclusive Education at the University of Namibia. It is required of Master students to conduct research studies and the title of my research is: "*Teachers' experiences and roles of the revised Biology curriculum: A case of selected secondary schools in Ompundja circuit, Oshana Region, Namibia."*

Kindly take not that there are no right or wrong answers to questions contained in this interview. Please answer all the questions to the best of your ability and your personal judgment is highly respected in this interview.

Thank you for agreeing and your willingness to participate in this study. Be rest assured that the information you will provide in study will be treated with confidentiality. It will be used for research purpose only.

PART A

Participant's Biographical Information

1. What is your gender? _____Male _____female. *(Tick behind the appropriate answer*)

2. For how long have been in the teaching profession? _____years _____ months.

3. What promotional position are you in at the moment? ____HOD ____Principal ___none

4. What is your highest academic qualification? _____.

5. What is your highest teaching qualification? __ ECP___ diploma ____ degree ____None.

6. In which area do you specialize? _____

7. Which subjects are you teaching now? _____

_____

_____

PART B

Personal Views of Participants

2. How do you view the syllabus content of the revised Biology curriculum?

_____

_____

_____

_____

3. What is your view on the amount of teaching time allocated to the revised Biology curriculum?

_____

_____

_____

4. What is your personal opinion on the recommended teaching methods of the revised Biology curriculum?

_____

_____

_____

_____

5. Which sections of the revised Biology curriculum are easy to teach as compared to the old curriculum?

_____

_____

_____

_____

6. Which sections of the revised Biology curriculum are difficult to teach as compared to the old curriculum?

_____

_____

_____

_____

7. What gaps of the old curriculum do you think does the revised Biology curriculum fill?

_____

_____

_____

_____

8. What are the roles and responsibilities of Secondary School teachers in the implementation of the Biology revised curriculum?

_____

_____

_____

_____

9. What would you suggest could be done to improve on the teaching of the revised Biology curriculum?

   a. _____

      _____

      _____

b. _____

_____

_____

c. _____

_____

_____

d. _____

_____

_____

e. _____

_____

_____

f. _____

_____

_____

THE END

Thanks very much for your participation.

Appendix E: Informed consent for participants

Informed Consent for Secondary schools Biology teachers in Ompundja Circuit, Oshana Region. I am inviting you to participate in research titled: TEACHERS' EXPERIENCES AND ROLES OF THE REVISED BIOLOGY CURRICULUM: A CASE OF SELECTED SECONDARY SCHOOLS IN OMPUNDJA CIRCUIT, OSHANA REGION, NAMIBIA

Name of Principal Investigator:	Frostinia T. Vatileni
Name of Sponsor:	None

This Informed Consent Form has two parts:

• Information Sheet (this section, to share information about the study with you)

• Certificate of Consent (for signatures if you choose to participate)

You will be given a copy of the full Informed Consent Form.

PART I: INFORMATION SHEET

Introduction

I am Frostinia T. Vatileni, pursuing a Master's degree at the University of Namibia. I am doing research on teachers' experiences and roles of the revised Biology curriculum: A case of selected Secondary schools in Ompundja Circuit, Oshana Region, Namibia. I am going to give you information and invite you to be part of this research. You do not have to decide today whether or not you will participate in the research. Before you decide, you can talk to anyone you feel comfortable with about the research. This consent form may contain words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain and if you have questions to ask, you can ask me.

Purpose of the Research

The institutions of education can only produce quality, open-minded individuals if the subject curriculum is effectively implemented. On the other hand, teachers are often entrusted to implement the revised curriculum with little or no training given on how to implement such a curriculum and this kind of situation may hamper teachers to implement the revised curriculum effectively. Therefore the researcher would like to know what Ompundja Circuit teachers are experiencing and their roles as they are implementing the Biology revised curriculum and most importantly, what they do on a daily basis to ensure that the Biology revised curriculum is implemented to the letter.The study will be conducted in Oshana Region, Ompundja Circuit, at five (5) selected Secondary schools whereby fifteen (15) Biology teachers will be interviewed.

Participant Selection

You are being invited to take part in this research because I feel that you are in a position to have rich information and your experience as a Biology teacher can contribute much to the understanding and knowledge of revised Biology curriculum.

Responsibilities

This research will involve your participation in an individual interview that will take about 30 minutes. You are kindly urged to provide honest information for this study by answering interview questions.

Benefits

There will be no direct benefit to you, but your participation is likely to help us to find out more about what Biology teachers are experiencing and their roles as they are implementing the Biology revised curriculum in Ompundja Circuit.

Risks

The discussion is on opinions on teachers' experiences and roles as they are implementing the Biology revised curriculum. "There is a risk that you may share some personal or confidential information by chance, or that you may feel uncomfortable talking about some of the topics. However, I do not wish for this to happen. You do not have to answer any question or take part in the interview if you feel the question(s) are too personal or if talking about them makes you uncomfortable. However, Participants are reassured that there is no harm that will result from participating in this study.

Reimbursements

You will not be provided with any incentive to take part in the research. However, I will appreciate you a lot for participation and for your time.

Confidentiality and Sharing the Results

The research being done in Ompundja circuit may draw attention and if you participate you may be asked questions by other teachers in the circuit. We will not be sharing information about you to anyone outside of the research team. The information that I will collect from this research project will be kept private. Any information about you will have a number on it instead of your name. Only the researcher will know what your number is and information provided will be locked in a safe place to avoid leakage of the information.

You are reassured that collected information will only be used for academic purposes and it will not be shared with or given to anyone except my supervisor Dr Charles Chata as well to the authorised University personnel should there be a need to do so.

Right to Refuse or Withdraw

You do not have to take part in this research if you do not wish to do so, and choosing to participate will not affect your job or job-related evaluations in any way. You may stop participating in the interview at any time that you wish without your job being affected. I will give you an opportunity at the end of the interview/discussion to review your remarks, and you can ask to modify or remove portions of those, if you do not agree with my notes or if I did not understand you correctly.

Who to Contact

If you have any questions, you can ask them now or later. If you wish to ask questions later, you may contact Frostinia T. Vatileni, at cell phone number: 0812207766 or email: frostinia@gmail.com .

This research has been reviewed and approved by the relevant Ethics Review Committee at the University of Namibia, which is a committee whose task it is to make sure that research participants are protected from harm. The committee reports to the University's Centre for Research Services. If you wish to contact this Centre, please call +264 61 206 4673 or send an e-mail to research@unam.na. Otherwise, you can also contact my supervisor, Dr. Charles Chata at Tel, +264 662626112 or send an e-mail to cchata@unam.na , if you have any further queries or encounter any problems.

PART II: CERTIFICATE OF CONSENT

I have been invited to participate in research about teachers' experiences and roles of the Biology revised curriculum. A case of selected Secondary schools in Ompundja Circuit, Oshana Region, Namibia

(This section is mandatory.)

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have been asked, have been answered to my satisfaction. I consent voluntarily to be a participant in this study

…….

……

Name of Participant (print) Signature of Participant

……

Date (day/month/year)

Statement by the Researcher/Person taking Consent

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands that the following will be done:

1 .I encouraged him/her to ask questions and took adequate time to answer him / her.

2. I am satisfied that he or she adequately understands all aspects of the research, as discussed above.

3. I did not use an interpreter

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability.

I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this ICF has been provided to the participant.

…….

……

Name of Researcher/Person taking Consent (print) Signature

……

Date (day/month/year)

If Assisted by an Interpreter: Statement by Interpreter

I have accurately interpreted the information sheet to the potential participant in …….. (insert name of target language), and to the best of my ability made sure that the participant understands that the following will be done:

1.

2.

…….

……

Name of Interpreter (print) Signature

……

Date (day/month/year)