FACTORS AFFECTING EFFECTIVE TEACHING OF LIFE SCIENCE PRACTICAL ACTIVITIES IN JUNIOR SECONDARY SCHOOLS IN OKONGO CIRCUIT, OHANGWENA REGION

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Abstract

The purpose of this study was to investigate the factors affecting effective teaching of practical activities in Life Science in Junior Secondary schools (JSS) in the Okongo circuit, Ohangwena Region. The study answered the following research questions: 1). What are the factors affecting effective teaching of practical activities in Life Science at JSS in the Okongo Circuit in Ohangwena Region, Namibia? 2). How can the Life Science teachers be assisted to improve the teaching of practical activities in Life Science at JSS in the Okongo Circuit in Ohangwena Region, Namibia? Mixed-methods research design involving both qualitative and quantitative approaches were used in this study. Equally, a survey questionnaire, interview guide and observation guide were used to collect data. The sample of the study included ten Principals, eight Head of Departments and ten Life Science teachers from the ten JSS in Okongo circuit. The participants were purposively selected using the total population sampling. The results of the study revealed various factors that affect the effective teaching of practical activities in Life Science in JSS in the Okongo circuit. These factors include; lack of laboratories, lack of laboratory equipment and apparatus, lack of timetable slot allocated to practical activities, teachers high workload, lack of training workshop for teachers on how to conduct practical activities, lack of electricity in some schools, and lack of laboratory manuals to guide the teachers on how to conduct practical activities. In order to help the teachers to improve the teaching of Life Science practical activities in Okongo Circuit in Ohangwena Region, the participants suggested the need for the provision of: 1) well-equipped laboratories at the JSS, 2) teachers' training on how to conduct practical activities in Life Science, 3) adequate funds to procure equipment, and 4) dedicated timetable slots for Life Science practical sessions.

Keywords: Factors, Life Science, effective teaching, practical activities.

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List of acronyms and abbreviations

CBT	Conditions-Based Theory
EBC	Educational Broadcasting Corporation
H 1-H10	Head of departments from number one to number ten
HoD	Head of Department
JSC	Junior Secondary Certificate
JSS	Junior Secondary School
MoEAC	Ministry of Education Arts and Culture
P 1-P10	Principals from number one to number ten
T1-T10	Life Science Teachers from number one to number ten
UNAM	University of Namibia

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Dedication

This study is dedicated to my son, Seven Nafimane Nghipuvanhu Halweendo. The attention that I was to give my son was replaced by this study. As a mother, I owed you the attention that I am ready to give you after the completion of this study.

Declaration

I, PUYE PENEFINA HAILONGA, hereby declare that this study is my own work and is a true reflection of my research, and that

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CHAPTER ONE: INTRODUCTION

1.1. Background of the study

Life Science is among the science subjects that are taught at Junior Secondary Schools (JSS) level in Namibia. The other science subjects available at the Junior Secondary level are: Physical Science, Mathematics, Chemistry, and Agricultural Science. Life Science is a natural science subject that should be taught in two mixed ways, theory lessons and practical lessons. The Ministry of Education Arts and Culture [MoEAC] (2020), specified three primary assessment objectives in Life Science, namely: objective A, objective B, and objective C.

Under assessment objective A, the learners are expected to learn and be able to use scientific terminologies, signs, standards and measurement correctly. Learners are also expected to be able to use scientific instruments and equipment, as well as to apply the techniques of operation and safety (MoEAC, 2020). Furthermore, learners are expected to be able to use scientifically proven facts, concepts, theories and principles. Essentially, the Objective A is made up of specific learning objectives which require learners to be able to identify items, give examples, give reasons, suggest ways, recognize physical quantities and variables, define relevant scientific concepts, discuss and outline simple contents of the subject (MoEAC, 2020).

The assessment objective B involves handling of information, application and solving of problems. In this instance, pupils are expected to make use of written symbols, graphics, and express in numbers, and should be able to: analyze novel situations in a logical and deductive manner. Learners are also expected to locate, select, organize and present information from a variety of sources (MoEAC, 2020). Additionally, under learning objective B, learners are expected to translate information from one

form to another; use information to identify patterns, report trends and draw inferences, present reasonable explanations for phenomena, patterns and relationships, and make a value judgement about scientific and technological applications (MoEAC, 2020).

The assessment objective C is concerned with practical (experimental and investigative) skills, and this expect learners to be able to use apparatus and materials, observe, measure, record, process and evaluate experimental observations and data. (Ministry of Education Arts and Culture, 2020).

The practical activities, in particular, have been identified as the heart of mastery of science discipline such as Life Science (Tolessa & Mohammed, 2016, p. 23). These scholars believe that when there are no practical activities to engage learners in handling and manipulating real life objects, all the concepts learned become inert knowledge. In a recent report, the Ministry of Education, Arts and Culture (MoEAC) marks that there are several questions based on investigative and planning skills in the Life Science Junior Secondary Certificate (JSC) examination, which some candidates find difficult to answer, and perhaps require further practice (MoEAC, 2020).

This situation seems to be a recurring problem in Ohangwena, one of the fourteen regions in Namibia. The Examination Report of 2020 revealed that, most Life Science learners in the region scored below 50% in the practical paper which assess learners' competencies under objective C. Information obtained from the Ohangwena Regional Education Directorate showed that the Life Science learners' poor performance is particularly worrisome in the Okongo Circuit.

Practical work is a crucial component in the teaching of scientific processes and concepts in Life Science. However, studies have revealed that there are several factors that are affecting the effective teaching of practical activities in Life Science such as lack of laboratories, lack of equipment, inadequate time allocation and lack of laboratory technicians (Chala, 2019, p. 2-9).

Some schools have tried to put remedies in place to help educators to ease the challenges that are hindering the process of effective teaching of practical activities in Life Science. Such measures include borrowing materials from sister schools and encouraging teachers to improvise and bring real objects from home and use them at school. Despite these measures to ease the teaching of Life Science practical activities, especially in the Okongo Circuit, it is open that there is no documented study that established the factors that are affecting the effective teaching of Life Science practical activities in the circuit. Hence, no possible remediation measures were identified .Thus, this study investigated factors affecting effective teaching Life Science practical activities in Junior Secondary Schools in the Okongo Circuit of Ohangwena Region.

1.2. Statement of the problem

In recent years, Life Science learners in the Okongo Circuit in Ohangwena Region, Namibia have been performing poorly in the practical based assessments in Junior Secondary Certificate (JSC) Examination (MoEAC, 2020). Between 2017 and 2021, data available at the Okongo Circuit Education Office showed that the Life Science learners recorded the following pass percentages in the practical-based examination: 2017 (24%), 2018 (36%), 2019 (35.1%), 2020 (46.41%), and 2021 (39%). These poor performances might be due to lack of effective teaching of Life Science practical

activities at the Junior Secondary Schools in the area. However, the ineffective teaching of Life Science practical activities could be attributed to several factors inherent in the circuit. Despite the persisting of poor performances of Life Science students in practical-based examinations in Okongo Circuit and Ohangwena Region as a whole, there is no documented study to establish the associated factors, based on which appropriate remediation measures could be identified.

This study, therefore, investigated factors affecting effective teaching of practical activities in Life Science at Junior Secondary Schools in the Okongo Circuit. The study also identified possible mitigation measures to enhance the teaching of Life Science practical activities in the area.

1.3. Research questions

1. What are the factors affecting effective teaching of Life Science practical activities at Junior Secondary Schools in Okongo Circuit in Ohangwena Region, Namibia?
2. How can the Life Science teachers be assisted to improve the teaching of practical activities in Life Science at Junior Secondary Schools in Okongo Circuit in Ohangwena Region, Namibia?

1.4. Significance of the study

The study targeted to identify factors that are affecting effective teaching of Life Science practical activities at Junior Secondary Schools in Okongo Circuit and also to establish the views of the teachers on measures that probably are implemented to enhance the effective teaching of Life Science practical activities in the area. Thus, the outcome of this study might be advantageous to curriculum planners, Life Science teachers, Heads of Science Department, principals and the Ministry of Education, Arts and Culture. As efforts are being made to improve the teaching of Life Science.

1.5. Limitations of the study

The Life Science teachers, Head of Departments and Principals were initially reluctant to provide credible information that would enable the researcher to establish the actual factors affecting effective teaching of Life Science practical activities in the survey area. This challenge was overcome by the investigator by describing the significance of the study to respondents.

Furthermore, this study was done during school days, so time was a challenge as Life Science teachers, HODs and principals did not have sufficient time for this study due to their demanding school works. However, participants were encouraged to complete the questionnaire during their free time and interviews were held at the participants' convenience after office hours.

Life Science is only offered by ten schools in the Okongo circuit. Hence, this becomes a limitation to this study. Given the limited numbers of schools means limited population of the study. Despite the limited numbers of schools all the sampled population participated in the study.

1.6. Delimitations of the study

The study concentrated only on the factors affecting effective teaching of practical activities in Life Science at Junior Secondary Schools in the Okongo Circuit, in Ohangwena Region. Therefore, the study might not be generalized to all the Junior Secondary Schools of Ohangwena Region neither of the whole Namibia.

1.7. Definition of key terms

Practical activities include both investigations and experiments that can be done in the classroom, laboratory or in the field in the environment to enhance learners' understanding of Life Science concepts.

Life Science is a science subject that is taught at the JSS level in Namibia and involves the learning of living organisms (plants and animals) and non-living organisms. The curriculum is drawn from related subject areas such as Biology, Botany, Zoology, Microbiology, Physiology, Biochemistry and life processes.

Effective teaching refers to teaching in a successful way that utilizes an appropriate pedagogy and practical activities as well as learning materials to ensure that learning objectives are achieved at the end of the lesson.

Factors refer to any circumstance that influence or contribute to a result or an outcome, and in this case, the teaching of Life Science practical activities in JSS, especially in the Okongo Circuit.

1.8. Summary of the chapter

This chapter discussed the study background, problem statement, research questions, significance, limitation, and delimitation of the study, and the definition of key terminologies.

Next chapter will present the literature review relevant to the study.

CHAPTER TWO: LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1. Introduction

This chapter concentrates on the review of related studies done in the past by previous researchers. Thus, the literature review is divided into sub-topics that are related to the research topic and research questions.

2.2.1 History of practical work

Innovation of practical activities in science subjects' curricula started around 1950s in the United States of America and Europe (Tamir, 1991 as cited in Nghipandulwa (2011). This initiative rapidly spread to the whole world including countries like Namibia, Ethiopia, Nigeria and Botswana. This greatly changed the way science subjects are taught in schools. Practical work was introduced into the teaching of Natural science subjects, including Life Science and Physical Science subjects. The establishment of practical work of science subjects allowed students to reciprocate with the learning environment. Hence, one reasons why practical activities uniquely featured science education (Tamir, 1991) as cited in Nghipandulwa (2011)

After Namibia independence (21 March 1990), the government introduced a new curriculum, following which, Life Science was one of the science subjects that were taught at Junior Secondary phase (Grades 8-10). In 2019, Namibia has implemented its 'new curriculum. Since then, practical work has become a component of Life Science teaching and learning process as well as part of assessments. Currently, Life Science learners in Namibia are assessed in practical examination question paper that is an alternative to real practical (Nghipandulwa 2011).

2.2.2 What is practical activity?

Millar (2004,) defines practical as laboratory work that may include experiments either in groups or individual work, lectures, observations, demonstrations or group discussions where by the teacher facilitates the learning process while learners are actively involved in handling and observing real objects, equipment and chemicals to draw conclusion from observed results.

A study carried out in Ethiopia by Bekalo and Wellford (2000), revealed that there is a misinterpretation on the meaning of practical work. According to these researchers, some science teachers have a different understanding of practical work. To some teachers, practical work means only laboratory work which involves only experiments.

Similarly, Bekalo and Wellfords' (2000), study disclosed that, the larger number of science educators believe that the fundamental aim of practical activities is confirming facts in science. Bekalo & Wellford 2000, argue that ''it is easily forgotten when something is just heard, it is easily remembered when it is seen and easily understood when it is done practically''. This is the justification or doing practical activities in science

UK Essays (2018) defines practical teaching as any teaching activities which engage students to observe and manipulate objects, apparatus and chemicals to develop concrete understanding. Practical work was also regarded as the explorations and investigations that allow science learners either in groups or individuals to use equipment, apparatus, and chemicals to interact with the environment (biotic and abiotic components), record, and analyses data (UKEssays, 2018), Practical activities may also involve demonstrations and discussion between learners and their teachers.

Needham (2014) has a broader definition of practical work and regards it as a situation whereby learners can experience things in hand, manipulate equipment, objects, apparatus and materials to make observations to enhance their own understanding.

Thus, practical activities are all activities that involve investigation, experimentations and observations that are done in science subjects to explore, explain the world around us, develop new ideas, and check results of other scientists. Notably, practical activities may include both investigations and experiments that can be done in the classroom, laboratory or in the field in the environment.

2.2.3 Importance of practical work

Practical activities have been identified as the heart of mastery of science discipline such as Life Science (Tolessa & Mohammed, 2016, p. 32). According to these authors, when there are no practical activities to engage learners in handling and manipulating real life objects, all the concepts learned become inert knowledge. This is to say practical activities enable learners to understand concepts better when they are doing something in real life as compared to when they are quiet and passively waiting for the teacher to explain everything in theory lessons. Different scholars in science education contend that practical activities have many purposes, such as motivation for students, the excitement of discovery, consolidation of theory, development of manipulative skills, knowledge of standard techniques, general understanding of data handling, development of other skills such as analytic, evaluative, planning, applied mathematically (Chala, 2019, p. 2-9).

Most science educators have treasured the significance of teaching practical work in Life Science subject. They have indicated that learners learn better when they are actively involved in doing something instead of being told or shown something

(Nghipandulwa 2011). Practical activities engage learners; therefore, it is a crucial part of teaching Life Science subjects. As stressed by Hodson (1990), practical work can easily make learners understand and remember concepts learnt. Additionally, Kandjeo-Marenga (2008), implies that practical activities should aim to actively involve learners in the contemporary world and also in the future. Moreover, Practical work is vital in the teaching of science subjects as it plays a major role in developing learners' practical skills, subject content knowledge and better understanding (Kasanda, Kapenda, & Kandjeo-Marenga, 2001).

Thus, it is crucial that Life Science teachers prepare and organize practical activities that will enable learners to develop their own understanding, prove hypothesis and draw conclusions (Liswanso, 2019).

Remarkably, practical works enable learners to have a procedural understanding to carry out investigations and experiments step-by step in a correct manner. It further stimulates the development of analytical and critical thinking skills to promote learners' interest in science subjects. Hence, it is pertinent t that teachers teach practical work to encourage and help learners to do better in science (Ottander & Grelson, 2006) as cited by Liswanso (2019).

Nghipandulwa (2011) emphasized the importance of teaching practical work as it allows both teachers and learners to interact with each other as a social unit by sharing suggestions and information about the real world. Similarly, practical work provides opportunities to develop learners' practical skills of the scientific phenomena.

Therefore, practical activities enable teachers to fully teach the objectives that equip learners with the specific skills to use. Moreover, such practical activities enable learners to organize techniques, apparatus and materials, observe measure and record,

handle process and evaluate experimental data and plan investigations as indicated under learning objective C of the Life Science syllabus, (Ministry of Education Arts and Culture 2020).

2.2.4 Factors affecting the teaching of practical work in schools

A study by Chala (2019) about practice and challenges facing practical work implementation in Natural Science subjects at secondary schools in Ethiopia, remarked that practical work is crucial for the teaching and the learning of Science subjects in schools. A good -quality practical lesson in science subjects for instance Life Science helps to develop learners understanding of scientific process and concepts. Despite the significance of practical work in Natural Science subjects, observations revealed that practical work in Natural science subjects in schools worldwide; Namibia included, is ignored or not effectively implemented due to certain factors. Some factors identified by the previous researchers are:

2.2.4.1 Lack of laboratories

The lack of laboratories in schools is one of the factors that are affecting the effective teaching of practical work in science subjects like Life Science (Bakori & Cimora, 2010) as cited by Chala, 2019). Lack of laboratories leads to unsuccessful practical wok, which promotes short term memory in learners, and not expose them to development of the long term memory. If there are no laboratories, and no practical work, learners may not be exposed to scientific experiences that could help learners in the long run to develop scientific attitudes, skills and instill scientific mode of thinking.

In addition, Bello (2015) observed that the laboratories in some schools are not well equipped. In such instance, science teachers are unable to carry out practical activities

that may include planning experiments, making observations, collecting and processing data necessary in teaching learners to believe scientifically (p. 5-8). Henceforth, the teachers need to have access to well-equipped laboratory facilities for the development of scientific talents in learners.

According to the Ministry of Education Arts and Culture (2020), learners' poor performance in alternative to practical examination paper was as a result of the lack of relevant practical activities to develop the basic skills of the learners needed to handle the practical related problems. Similarly, a study by (Makgato, 2007), revealed that the majority of schools in the sample of his study had poor resources or laboratory work, such as equipment, apparatus and chemicals.

Contrary, some studies, for example that of Rogan and Aldous (2005) have disclosed that, statistically there is no a significant difference between well-equipped laboratories and effective teaching of practical activities in science subjects. Furthermore, Rogan and Aldous (2005) pointed out that even though some schools have all they need to carry out practical activities, only a few contact practical activities. Rogan and Aldous continued to affirm that they had four schools that have fully equipped laboratories and none of these schools conducted practical activities. The authors pointed out that boosting resources would make no difference at all, thus, other involvement are needed too. Furthermore, their study identified the interventions that were made to ease the teaching of practical activities in Science subjects. The interventions include; teachers training on how to carry out practical and teachers' motivation to plan and carry out practical (Rogan & Aldous, 2005).

Equally, Hattingh (2007) concurred that there is no significant relationship between resources and practical work. Instead, improved resources such as well-equipped laboratories will only work out if it is accompanied by other interventions like

teachers' training on how to use equipment, apparatus and chemicals (p.7-9). Teachers' capacity to plan quality practical lessons is also underscored in the study.

2.2.4.2 Lack of laboratory manuals

Laboratory manual is a document that outlined predetermined procedures on how practical activities should be carried out. It provides a comprehensive guide to the teachers on how a particular laboratory experiment should be set up and implemented. It is a concernment that some schools do not have laboratory manuals. This puts a burden on both teachers and learners as they have to come up with their own instructions on how practical will be carried out, which may not be appropriate in some instances. (Tamir, 1991). Having a laboratory manual is beneficial to the teaching of practical activities as it gives directions on how things should be done. Laboratory manuals save teachers' time and save equipment and other resources. It is of great concern that most schools offering natural science subjects like Life Science do not have laboratory manuals and this has a negative impact on the teaching and learning of science subjects (Harrison et al., 2009).

Oyoo (2013), in the study conducted in Kenya reported that, laboratory manuals are in short supply in schools. This affected the successful implementation of effective teaching of practical activities in science subjects. Effectiveness of teaching practical work in science subjects in schools requires laboratory instructions to guide teachers and learners. Thus, having laboratory manuals boosts practical instruction (Feyera, 2014, p. 11-13). A similar study carried in Nigeria, identified the lack of laboratory guides as one of the factors that affect the effective teaching of practical activities in schools. As a result, learners perform poorly in the practical examination paper as there are no instructions to guide the teachers and learners during practical lessons. Additionally, Adedayo (2015) found out that about 83% of secondary schools in

Nigeria have been challenged to implement practical activities as there are no resources like laboratory manuals. This is an explicit that laboratory manuals are essential in the teaching of practical work. However, it is not certain if the lack of laboratory manuals is a component that hinders effective teaching of Life Science practical activities in the Okongo Circuit-(the current study area), as there was no previous documented study that established such factors in the area.

2.2.4.3 Time allocation for practical activities on school timetable

Both educators and learners require adequate time to conduct practical activities successfully. Lamentably, inadequate time allocation for practical work has become an obvious problem in schools (Henshaw, 2013, p.4-7). In Namibia, it is explicitly indicated in the Life Science subject policy that Life Science is allocated four (40 minutes each) lessons per five days circle of the school timetable and five lessons per seven days circle of the school timetable (MoEAC, 2020). However, time allocated to the Life Science subject is not adequate to cater for both theory lessons and practical lessons. As a result, teachers and learners do not have sufficient time to meet conclusive practical lessons, resulting to poor performance of learners in alternative to practical examination paper (Kapting ‘ei & Kimeli, 2014).

The periods for all practical lessons for science subjects should be increased to three or four lessons of forty minutes each per week (Abrahams, 2011). This is so as teachers and learners spend more time dealing with the practicalities of the practical activity such as, giving instructions, collecting and arranging equipment, producing data, and cleaning after the practical session (Abrahams, 2011).

2.2.4.4 Large class size

Many schools have large class size. In some instances, there might be approximately as many as about 80 learners per class group. (Oli & Olkaba, 2020, p. 6-10). Overcrowded classrooms make it difficult for teachers to interact with individual learners during practical lessons. Thus, large class size hinders the effective teaching of practical work in science subjects. In addition, large class size makes it difficult for individual learners to efficiently utilize the available materials, which in most instances are grossly inadequate to go round the learners. According to Danmole (2012), larger class size should be reduced, stressing that in Ethiopia, teacher-learner-ratio should be strictly 1: 40 as stipulated in the national policy in education.

When a classroom has a large student population as compared to the availability of apparatus, it discourages learners' interest toward practical activity (Ayeni & Olowe, 2016). Hence, when a class size is too large, it is difficult for the teacher to manage practical activities and not all learners may achieve the practical activity objective as it is difficult to give individual learners attention. In some schools, classes are full, 50 learners per class (Shikalepo, 2020, p. 6-8). Namibia's teacher learner ratio is 1:35 for Primary Schools and 1:30 for Secondary Schools (Haufiku, Mashebe & Abah, 2022). For example, in Ohangwena Region, in Namibia, the ratio of teacher to learner is 1: 27. However, Ohangwena Region is the most overcrowded region in Namibia, resulting to having 40 earners in some classes (Nande, 2023), including schools in the Okongo Circuit.

2.2.4.5 Lack of laboratory technicians

Laboratory technicians are the backbone of practical work in science subjects like Life Science. According to Tolessa (2016), the absence of laboratory technicians in most schools forced science teachers to assume laboratory technicians' duties, this forces

science teachers to perform both teachers' role and laboratory technicians' roles, which affect effective planning and teaching of practical activities (p.32). Technicians are the expertise when it comes to practical work as compared to science teachers. Notably, they are not only detailed with knowledge on the content of practical but also in matters of technique, health and safety, efficiency and economy, and this reduce workload of science teachers (Chala, 2019, p. 2-9). Laboratory technicians help science teachers to deliver quality, stimulating practical lessons (Kibirige, Rebecca & Mavhunga, 2014). According to these authors, the role of laboratory technicians is undermined in most schools by top management and non-science teachers. On the other hand, laboratory technicians are not just responsible for washing equipment, but are more than that.

2.2.4.6 Teachers work experience and job satisfaction

Study findings revealed that teacher's knowledge and skills are influenced by work experience (Tenaw, 2015). High work experience enhances teachers' job performance self-concept and effectiveness, especially in a practical-based subject such Life Science. In a study in UK, 60% of science teachers indicated that they were confident in teaching practical work as they gained experience through practical work at schools or gained through conferences and courses (Tenaw, 2015). Teachers that are inexperienced show low self-esteem when conducting practical lessons (Tenaw, 2015). Therefore, science teachers should be trained through workshops to gain more experience on how to carry out practical activities.

Job satisfaction plays a major role on teachers' performance. Teachers that are motivated to do their practical work are more likely to be committed to their practical work as compared to teachers that are not motivated (Baker & Smith, 1997, p. 2-6).

There is a significant connection between teachers' motivation and delivering quality practical lessons in science subjects. Besides, there are different ways that teachers can be motivated to work hard and teach their practical work effectively. These includes, good remuneration, healthy working environment, team work and team building practices, and recognition of job well done (Shafiwu & Salakpi, 2013) . Hence, if teachers are not motivated to teach practical activities effectively, it can lead to poor quality practical lessons and not delivering engaging instructions in the classroom (Baker & Smith, 1997).

2.2.5. Measures for improving the teaching of Life Science practical activities in schools

Daba and Anbesaw (2016) in their study on factors affecting effective teaching of practical work in Life Science in Ethiopia, suggests that the Ministry of Education needs to launch science education projects in the science field. In this study on components affecting grade 12 learners' performance in Life Science at Lurivilu circuit, South Africa, Mukhethoni (2019) proposes that the Ministry of Education, should provide school laboratories with adequate equipment, apparatus, chemicals, laboratory manuals, technician, sufficient time and text books that will facilitate effective teaching of Life Science practical activities in schools as a priority. Moreover, Chala (2019) concludes that the curriculum developers should ensure clear guidelines on the use of laboratory methods by the Life Science teachers and provision of improved infrastructure for practical activities. However, it is not certain whether in the view of the Life Science teachers in Okongo Circuit, these measures are appropriate for addressing the factors affecting effective teaching of Life Science practical activities at schools in the area as there is no documented study that has been carried out to establish the specific needs.

According to Tamir (1991) as cited by Nghipandulwa (2011) Life Science teachers are encouraged to improvise and use what is available to plan and teach practical activities effectively. Furthermore, this author alluded that teachers can use the internet to google how practical are conducted in science, and to equally attend workshop to gain more knowledge on how to conduct practical activities. Recommendable, Life Science teachers can borrow equipment from sister schools. (Tamir, 1991) as cited by Nghipandulwa 2011).

2.2. Theoretical framework

Theoretical framework is a concise description of the major variables operating within the arena of the problem to be investigated together with the researchers overarching view of how the variables interact to produce a comprehensive model or important phenomena for shedding light on the problem (Badugela, 2012,) as cited in Liswanso, 2019). This study is based on two theories; Conditions based theory and Constructivism theory.

2.2.1. Conditions- Based Theory (CBT)

The first theory on which this study was based is the Conditions- Based Theory (CBT), which states that the acquisition of various learning outcomes such as practical skills in Life Science depends on the collective contribution of different factors (Ragan et al. n.d) as cited in Muyoyeta, Abah & Denuga, 2017). This theory relates to the current study for the reason being that the factors affecting effective teaching of Life Science practical work in Junior Secondary Schools in the Okongo Circuit might be due to different conditions such as lack of laboratories, chemicals, equipment, and uniform laboratory manuals among others. Thus, it is essential to

investigate the specific factors (conditions) affecting effective teaching of Life Science practical activities in the area and how the teachers may be assisted to better the teaching of Life Science empirical activities. This is crucial for developing intervention measures that could improve learners' performance in Life Science practical examinations in the area. When the conditions are conducive for teaching and learning, there is a possibility that effective practical teaching shall take place, and learners will execute better when it comes to Life Science empirical activities in the target area. For instance, in Life Science, if schools are provided with suitable laboratories, equipment, apparatus, chemicals, laboratory manuals, laboratory technicians, and teachers are motivated to plan and facilitate quality practical works, it is likely that learners will understand better and perform well in practical-based assessments.

2.2.2. Constructivism theory

The second theory on which this study was based is the constructivism theory. The proponents of this theory are; Jean Piaget and John Dewey. Constructivism theory explains that knowledge and understanding is socially constructed (Nghipandulwa, 2011). Teachers are not responsible for learners' understanding but to facilitate the learning process. Importantly, learners themselves construct their own understanding through challenging activities that promotes high level of thinking (Nghipandulwa, 2011). Through challenging activities such as practical work in Life Science and under suitable conditions such as science laboratories, enough equipment, chemicals and laboratory manuals available for teaching and learning, learners might be effectively taught to construct their own understanding and perform better in practical examination paper.

According to George (1991) as cited by Naukushu (2011) constructivism theory refers to the idea that learners construct the own knowledge, either in their social groups or individual. In most instances, constructivists focus on thinking about the learning and not the object or lesson. Learning of knowledge depends on the meaning attributed to experience by the learner or a group of learners. Helping learners to construct their own understanding through practical work in Life Science is therefore essential in their learning.

Cobb (1999), believes that through constructivism, learners are able to encode knowledge from data, this makes it more flexible, transferable and more useful as compared to knowledge encoded to them by their teachers (p.3-8). Therefore, when there are no factors hindering the effective teaching of practical work in Life Science, learners become molded scientists that are able to reason scientifically and create their own understanding. Practical work when taught effectively enable learners to challenge experiments and observations which make them to develop a high level of thinking capacity that enables learners to develop the potential to work independently and set up their own mastery.

Constructivists focus more on learner centered classroom than teacher centered. Besides, constructivists are against the idea of learners seen as empty vessels that should passively sit and observe their teacher. Instead, constructivists believe that learners are not empty vessels; they can part- take in their leaning process with the facilitation of their teacher if components that may inhibit the teaching of empirical work are well managed. Constructivism theory encourages active engagement of learners in the learning process. Teachers should be seen as facilitators and mentors that help learners to develop and assess their own learning and understanding

(Educational Broadcasting Corporation, 2004). Distinctly practical activities are one of the learner-centered approaches among others such as cooperative learning, inductive learning, gamify learning, expeditionary learning, active learning, and flipped classroom learning that allow learners to plan and carry out practical work to create their own understanding (Olugbenga, 2021). Thus, constructivism theory is suitable for this study. It is during practical work that learners collaborate and learn from their peers. Learners' collaboration during practical activities in Life Science is vital as it allows learners to pick up best strategies and methods from each other for better understanding (EBC, 2004).

2.3. Summary of the chapter

Chapter two discussed the history of empirical work, definitions of practical activities, the importance of empirical work, factors affecting effective teaching of practical activities in schools such as, lack of laboratories, lack of laboratory manuals, time allocation for practical activities on school timetable, large class size, lack of laboratory technicians, teachers work experience and job satisfaction .Chapter two further discussed measures for boosting effective teaching of Life Science in schools, and the theoretical framework. Next chapter provides the research methodology.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1. Introduction

This chapter describes the research design, population of the study, sample and sampling procedure. Research instruments, data collection procedures, data analysis procedures, ethical considerations will also be discussed in this chapter and lastly the summary of this chapter.

3.2. Research design

Exploratory mixed-methods research design was used to address the research questions. The mixed-methods research design involves the collection and analysis of both qualitative and quantitative data in a single study (Creswell, 2014). The quantitative approach used survey questionnaire to establish the specific factors affecting effective teaching of Life Science practical activities at the Junior Secondary Schools in Okongo Circuit while the qualitative approach used follow-up interview to establish how the Life Science teachers need to be assisted to enhance the teaching of Life Science empirical activities in the area.

3.3. Population of the study

Population consisted of 30 respondents made up of 10 Life Science teachers, 10 Head of Departments (HODs) and 10 Principals in the ten Junior Secondary Schools that offer Life Science in Okongo Circuit.

3.4. Sample and Sampling procedure

The study used the total population sampling method to select the sample of 30 participants which included all the 10 Principals, 10 HODs and 10 Life Science educators of the survey area to complete the survey questionnaires. Total population sampling was suitable for this study as the population size is little. Furthermore, a

subsample of 3 Principals, 3 HODs and 3 Life Science teachers who have at least, two years of teaching experience in their respective positions in the study area was purposively selected to take part in the follow-up interview. The purposive sampling method enabled the researcher to select only information-rich participants that were considered relevant to answering the research questions (Acharya et al., 2013, p. 3-6).

3.5. The Research instruments

Survey questionnaires, observation guide and interview guide was used to collect data about the factors affecting effective teaching of Life Science practical activities in the study area.

3.5.1. The survey questionnaire

Survey questionnaires consisted of a mixture of closed and open-ended questions intended to collect data based on research questions. The questionnaire was divided into two sections: section A is made up of closed ended questions to explore the job title, work experience, qualification, and a record of factors that might influence the effective teaching of Life Science practical activities in Okongo Circuit. Section B of the questionnaire consists of open ended questions that are based on the research questions. Under this section, respondents are required to freely share their opinions, and suggestions without restrictions.

3.5.2. The observation guide

The observation guide consisted of a list of items related to Life Science practical teaching such as availability of laboratories, availability of laboratory manuals, laboratory technicians, laboratory equipment, Life Science teachers, Science HODs, electricity supply, time allocation on the lesson timetable, and class size. The researcher personally observed these factors in the five Junior Secondary Schools

where the classroom observation was carried out and recorded the observed factors in each school.

3.5.3. The interview guide

The interview guide consisted of the interviewer's name, interviewee 's false name, school indication code, introduction, and open ended questions that were set based on the research questions to elicit respondents' views on how the Life Science teachers need to be assisted to enhance the teaching of Life Science practical activities of the survey area. Respondents were equally asked to state their personal experiences of the factors affecting effective teaching of Life Science practical activities at the respective schools. In addition, respondents were asked to give their recommendations/suggestions to address the stated factors affecting the effective teaching of Life Science practical activities at their school.

3.6. Data collection procedures

At first, the researcher obtained the research ethical clearance certificate from the University of Namibia's Decentralised Research Ethic Committee. Then the researcher sought and was granted permissions to conduct the study by the Ohangwena Educational Director, Okongo Circuit Inspector of Education, and the school principals. After obtaining the participants' consents, the researcher handed out the questionnaires to the participants and left them to respond to the questions for the period of three days. Thereafter, the researcher personally assembled the questionnaires for analysis. The researcher also observed live Life Science practical lessons in five out of the ten Junior Secondary Schools offering Life Science in Okongo Circuit to identify the factors affecting effective teaching of Life Science practical activities in the schools and recorded in the observation guide. One on one interviews were held with the subsample of 2 principals, 2 HODs and 2 Life Science

teachers at a pre-arranged time suitable for both the researcher and the interviewees in their offices. All the interviews were audio-recorded.

3.7. Data Analysis procedures

The quantitative data were analysed using descriptive statistics which is also known as summary statistics (mean, frequency count, and percentage) using Microsoft Excel's Data Analysis Tool Pak and presented in graphs and tables. On the other hand, the thematic method was used to analyse the qualitative data based on the following steps: step 1) familiarization whereby the researcher read and reread the data to identify patterns and similarity between the responses. Step 2 identification and classification of data based on similar patterns and merging themes. For example, factors affecting the effective teaching of practical work in Life Science, measures that are put in place to assist Life Science teachers in improving the teaching of practical activities, and suggestions or recommendations. Then, the results were presented based on the themes that emerged according to the research questions.

3.8. Ethical considerations

The researcher obtained ethical clearance certificate from the University of Namibia's Decentralized Research Ethic Committee, and the research permission letter was issued by the postgraduate research support services. Then researcher requested and granted permission from the Ohangwena Regional Director of Education, Okongo Circuit Inspector of Education and the principals of the Junior Secondary Schools where the study was carried out.

The aim of the study and its significance was clearly explained to the satisfaction of the participants. Hence, the respondents were informed that their participation was voluntary, and they were guaranteed of their right to discontinue their participation at

any stage they feel uncomfortable to continue with the study with no condition attached. They were also requested to sign informed consents. Furthermore, the researcher informed the participants that information provided will be kept anonymous and no real names will be needed on the questionnaires. Soft copy of the data collected are stored in a zipped folder on personal computer protected with a password of which only the researcher has access to. The collected data will be kept for a period of three years before it will be deleted permanently. The hard copies of data collected will be kept in a locked safe at home and will be burnt away after the study is successful completed.

3.9. Summary of the chapter

The research design, population, sample and sampling procedures, research instruments, data collection procedures, data analysis and the research ethical consideration were discussed in this chapter. Next chapter presents the findings and discussions of this study.

CHAPTER FOUR: Results and Discussion

4.1. Introduction

Chapter four presents the results of the study, and discussion of findings. The chapter is divided into segments, namely, biographical information of participants, factors affecting the teaching of practical activities in Junior Secondary Schools in Okongo circuit and possible remedies, both quantitative and qualitative data collected were discussed under this chapter.

4.1.1. Important biographical information of participants

Table 1 depicts the demographic characteristics of the study participants. The participants consisted of ten Life Science teachers, (made up of six females and four males), ten Science Head of Departments (HODs) consisting of four females and six males, and ten principals (consisting of two females and eight males). This distribution by gender is based on participants' compositions in Junior Secondary Schools in Okongo Circuit at the time of the study.

The higher number of the participants has Bachelor of Education (Honours) qualifications, fewer numbers have Diplomas, and one has a Master of Education qualification. The level of teacher's academic qualification has a major role in the teaching and delivery of quality practical lessons. Learners that are taught by qualified teachers with higher qualifications are likely to acquire more knowledge and skills than learners taught by teachers with lower qualifications. The more one is well informed due to higher training and qualification, the more one is likely to excel in his /her job performance (Canales & Maldonado, 2018, p. 3-5). This also applies to the teaching of Life Science, where the teacher's level of training is critical for job effectiveness. However, academic qualifications of Life Science teachers may not be

a factor affecting the effective teaching of practical activities in the study area as the findings showed that the majority of the participants (80%) have Bachelor of Education (Honours) qualification while only 20% have Diploma in their subject areas. In Namibia, the minimum academic qualification for secondary school teachers as per Namibia Qualification Authority teachers' standards is a Diploma in education. Nonetheless, teachers are not limited to obtain higher qualifications in education from accredited intuitions (MoEAC, 2006).

Table 1: Demographic characteristics of the participants (Principals =10, HoDs=10, and Life Science teachers =10 in JSS in the Okongo Circuit)

Demographic Characteristics	**Descriptive statistics**	**Principals**	**HDs**	**Teachers**
Qualification				
Diploma	Observed frequency	2	4	2
	Total frequency	10	10	10
	Mean	0.2	0.4	0.2
	Percent (%)	20	40	20
BED. Honors	Observed frequency	7	6	8
	Total frequency	10	10	10
	Mean	0.7	0.6	0.8
	Percent (%)	70	60	80
Master's Degree	Observed frequency	1	0	0
	Total frequency	10	10	10
	Mean	0.1	0.0	0
	Percent (%)	10	0	0
Teaching Experience				
1-5 years	Observed frequency	0	0	2
	Total frequency	10	0	10
	Mean	0	0	0.2
	Percent (%)	0	0	20
6-10 years	Observed frequency	1	3	3
	Total frequency	10	10	10
	Mean	0.1	0.3	0.3
	Percent (%)	10	30	30
10 years and more	Observed frequency	9	7	5
	Total frequency	10	10	10

	Mean	0.9	0.7	0.5
	Percent (%)	90	70	50
Gender				
Male	Observed Freq.	8	6	4
	Total freq.	10	10	10
	Mean	0.8	0.6	0.4
	Percent (%)	80	60	40
Female	Observed freq.	2	4	6
	Total freq.	10	10	10
	Mean	0.2	0.4	0.6
	Percent (%)	20	40	40

Key: Principals =10, HODs =10, teachers (Life Science) = 10

The results further revealed that 70% of participants have been teaching Life Science for 6-10 years, and only 30% have been teaching Life Science for 1-5 years. Various studies revealed that there is a connection between teachers' cognate experience and teaching effectiveness. Teachers with more years of teaching experience tend to produce higher performance of learners in practical examinations (Canales & Maldonado, 2018, p.3-9). Thus, the teaching experience of Life Science teachers directly affects their knowledge and skills on how to effectively teach practical activities.

Research question one: What are the factors affecting effective teaching of practical activities in Life Science at Junior Secondary Schools in the Okongo Circuit in Ohangwena Region, Namibia?

4.2. Findings from the questionnaires

Figure 1 below depicts the percentage distribution of Life Science responses on the factors affecting effective teaching of practical activities in Life Science in the study area. All the Life Science teachers (10 out of 10) indicated there is a lack of timetable slot for practical activities in Life Science in their schools. This suggests that the lack of timetable slot allocation to Life Science practical activities is the main contributing factor to the lack of effective teaching of practical activities in Junior Secondary

Schools in Okongo Circuit. Oftentimes, the regular lesson timetable slot, (40 minutes) is used for theory lessons. However, some teachers indicated that they sometimes share the 40 minutes slot to teach both theory lessons and few practical activities for formality's sake. Studies found out that the teaching of practical requires adequate time (Abrahams, 2011). Hence, adequate periods for practical activities should be allocated to Life Science subject. This is pertinent given that practical activities consume more time as teachers and learners spend more time dealing with the practicalities of the task such as giving instructions, collecting equipment, handling and producing data and cleaning (Abrahams, 2011). It was noted during the classroom observation that the school lesson timetables only cater for Life Science theory lessons and do not have provision for practical activities.

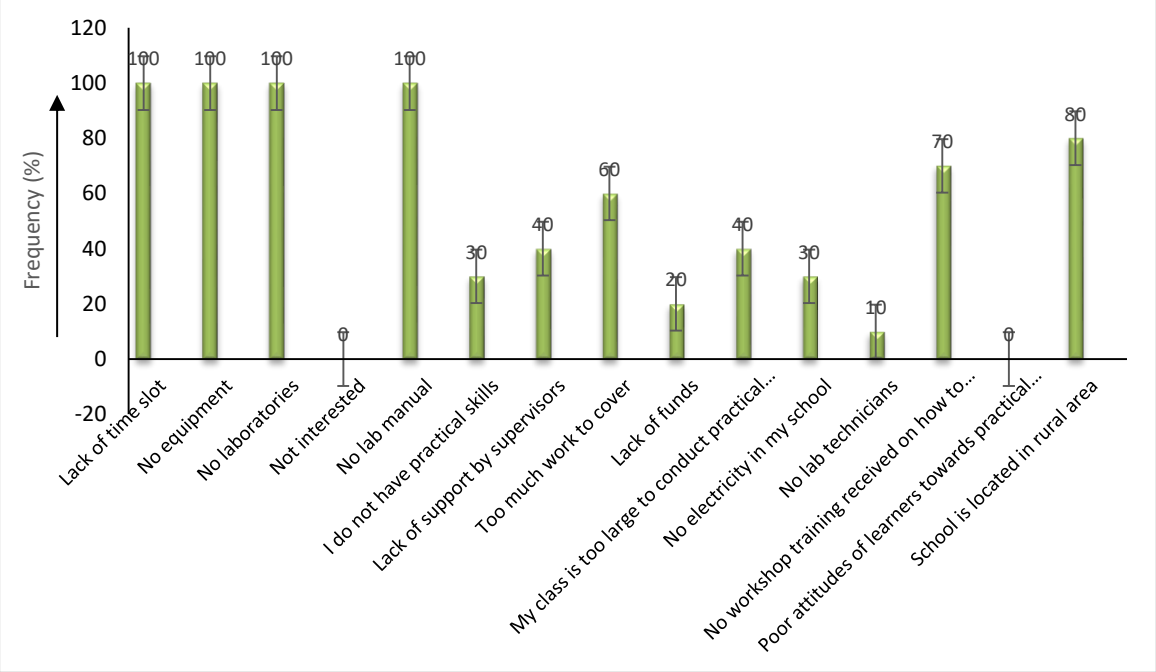

Figure 1: The Life Science teacher's responses on factors affecting the effective teaching of

Life Science practical in JSS of Okongo Circuit

Lack of laboratories was also identified as one of the biggest challenges affecting the effective teaching of Life Science practical activities in all Junior Secondary Schools in the Okongo Circuit. All the Life Science teachers indicated they do not have laboratories to carry out practical activities in their schools. During the lesson observation, it was noted that there was no laboratory in any Junior Secondary Schools in the study area where science teachers could carry out practical teachings. Furthermore, there are no laboratory equipment and chemicals in the schools. A well-equipped laboratory is crucial for the effective teaching of practical activities, especially, in the Life Science subject. The teachers indicated that they sometimes want to improvise to carry out basic experiments such as food test using iodine solution, and acidic properties using litmus paper. Nevertheless, these items are completely not available in their schools. Therefore, the lack of laboratories in schools is a contributing factor to ineffective teaching of practical activities in Life Science. If practical activities are not effectively taught, learners may not acquire the necessary skills and knowledge to tackle practical questions in the examination (Adedayo, 2015).

The Junior Secondary Schools (JSS) in Okongo Circuit do not have laboratory manuals to guide the teachers on how to conduct practical activities. Thus, the teachers conduct few practical activities based on their individual understanding without following any uniform guide that applies to all the JSS in the area.Only30% of the Life Science teachers in the circuit indicated that they do not have adequate skills on how to conduct practical activities and they do not have any workshop training on how to conduct practical activities. Studies revealed that laboratory manuals are needed by both teachers and learners as guidance to conduct practical activities successfully (Feyera, 2014, p. 11-13). If there are no laboratory manuals this can have

a negative impact on the successful implementation of effective teaching and learning of practical work as there are no detailed procedures on how to conduct practical activities (Feyera, 2014, p. 118-134). During classroom observations, there was no laboratory manuals in any JSS in Okongo Circuit.

More so, the teachers equally indicated that sometimes they do not get assistance from their supervisors. Supervisions in schools are important for checking the positive implementation of curriculum and providing relevant assistance to the teachers who are directly implementing the curriculum (Bwoi, 2019). Some teachers indicated that they were left alone to do what they can when it comes to the teaching of Life Science practical activities. Studies indicated that the lack of supervision can result in inadequate preparation by teachers and negative attitudes of students toward school activities (Bwoi, 2019).

Apart from the lack of support from supervisors, the teachers indicated that they are work loaded and may not complete all activities in Life Science. It was observed that Grade 9 Life Science syllabus alone stipulated 10 topics to be covered, and some of the topics like the Human body and Ecology are too long. When teachers are overloaded with work, it causes frustration and stress, and the teachers become less effective at delivering instructions, resulting in lower levels of learners' engagement and poor academic achievement (Kanwal et al., 2023).

Furthermore, lack of funds was identified as another challenge to effective teaching of Life Science practical activities in Junior Secondary Schools in the Okongo Circuit as indicated by the participants. Some of the schools lack adequate funds to cater for practical activities that are supposed to form part of Life Science teaching. As a result, the teachers mostly teach the theory lessons which do not cover practical skills that

learners are expected to acquire after completing the syllabus. Aryaman, Jafar, Mohamed, Ronobir, Curran, Kaushal, and Yazdani (2020), reported that the lack of funds in schools affect the teachers' teaching quality as there is no money to procure materials needed for quality teaching and learning.

The participants indicated that large class size in JSS in the Okongo Circuit constitutes a challenge to the teaching of practical activities in the area. During the classroom observation, it was noted that there is an average of forty learners in one class, and this is too large for the Life Science teachers to effectively teach the practical activities, considering the available resources. Large classroom size negatively affects the teaching of practical work in Life Science. This is to say, when the class is large, teachers are unable to give individual learner's attention. Fitfully, the apparatus that are available are not enough for everyone resulting in, forcing the teachers to use teacher-centered teaching approach instead (Ayeni & Olowe, 2016).

It was found out that lack of electricity in the schools constitute another challenge to the teaching of Life Science practical activities in JSS in the Okongo Circuit. During the classroom observations, it was observed that some classrooms are not electrified, whereas some that have electricity have functional electrical sockets to connect equipment that need electrical power to work. For example, boiling water at boiling point experiment or plugging a microscope to view a specimen, if there is no electricity, even such mere experiment cannot be conducted. This negatively affects the effective teaching and learning of Life Science practical activities.

Additionally, all the JSS in Okongo circuit lacked laboratory technicians. Laboratory technicians play a major role in the teaching of practical activities. They make sure everything is set in order from equipment, chemicals, electrical appliances, to sitting arrangements in the laboratory. Hence, the lack of laboratory technicians has a

negative impact on students' academic achievement in Life Science (Feyera, 2014, p. 11-13).

Another challenge to the effective teaching of Life Science practical activities in the study area is the geographical locations of schools. Eighty percent (80%) of JSS in the Okongo Circuit are located in rural areas. This affects access to certain materials such as food samples like bread, apples etc. needed for food test, as well as lime water, test-tube, posters, and iodine solution needed to improvise to conduct experiment. When the ideal materials are not available at schools, it can hinder the effectiveness of teaching practical activities (Shikalepo, 2019, p. 6-11). During the classroom observation, it was noted that only two out of the ten Junior Secondary Schools in Okongo Circuit are located in town.

As shown in Figure 2, most of the HODs indicated that lack of timetable slot, lack of laboratories, lack of laboratory manuals, and lack of laboratory technicians are the primary factors that are affecting the effective teaching of practical activities in Life Science in the study area. All (100%) of the HODs also pointed out that lack of workshops training for teachers on how to conduct Life Science practical activities equally contributes to ineffective teaching of practical activities.

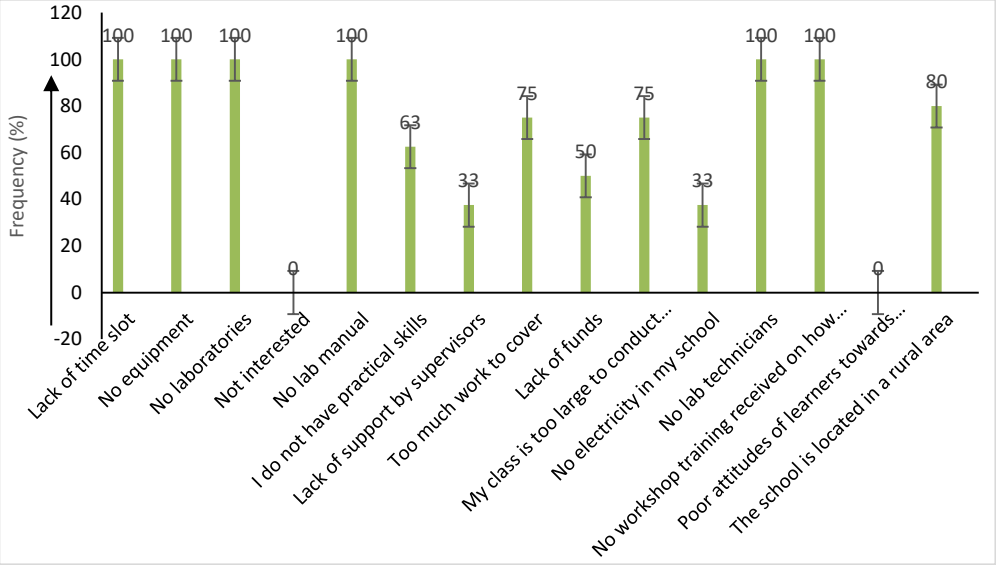

Figure 2: Responses from HODs on factors affecting the effective teaching of Life Science practical in JSS of Okongo Circuit

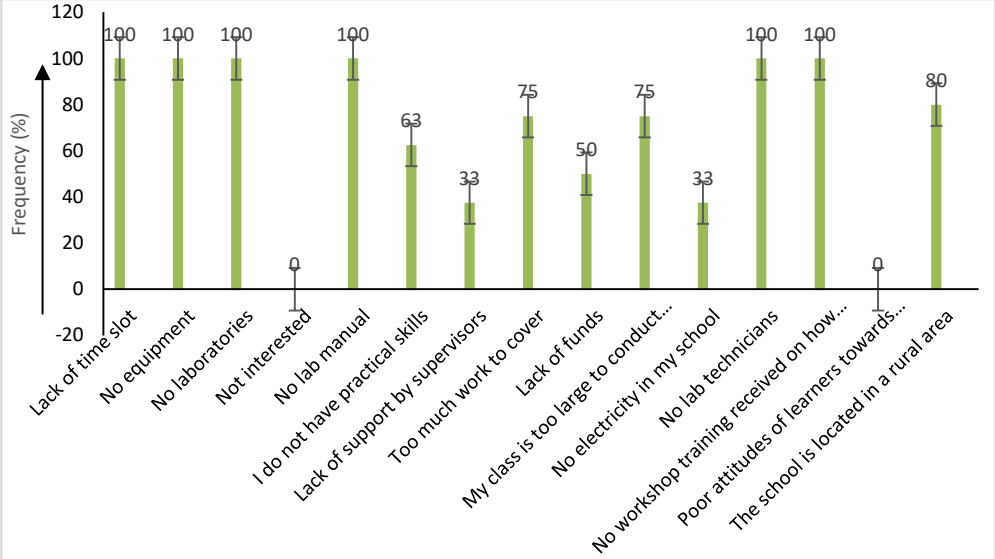

Figure 3: Principals responses on the factors affecting the effective teaching of practical activities in JSS of Okongo Circuit

Figure 3 showed that all (100%) the school principals concurred with the Life Science teachers and the HODs that the lack of timetable slot for teaching Life Science practical activities, lack of laboratories, laboratory equipment, laboratory technicians, and electricity constitute challenges to effective teaching of Life Science practical activities at their schools. The consistency of the findings among the different groups of participants (Life Science teachers, HODs, and Principals) attest to the prevalence of the challenges of teaching Life Science practical activities in Okongo Circuit.

4.3. Observations on the factors affecting teaching of Life Science practical activities in the study area

Table number 2 presents the checklist of items observed regarding the factors affecting effective teaching of Life Science practical activities in JSS in the Okongo Circuit. During the school visits and classroom observation, it was observed that 100% of the five schools that were visited has no laboratories, laboratory manuals, laboratory technicians, timetable slot for Life Science practical activities, and laboratory equipment. These are some of the factors that are affecting the effective teaching of Life Science practical activities in the JSS of the Okongo Circuit. According to Adedayo (2015), the lack of laboratory and laboratory facilities can negatively affect the teaching of practical work.

Furthermore, it was observed that all the five visited schools have Life Science teachers (100%). Only two schools out of five visited schools that have Science Head of Departments (40%). All five visited schools have Life Science subject head (100%). Life Science teachers and subject head are not among the factors affecting the effective teaching of practical activities in these schools. It was observed that schools without HODs are affected when it comes to the effective teaching of practical activities as there is no one to guide the teachers in the preparation of practical activities (Bwoi, 2019).

Table 2: Checklist of items observed in the selected schools regarding Life Science practical activities

Elements	Sch A	Sch C	Sch E	Sch G	Sch K	Total YES	Total NO
1. Life Science teacher available?	YES	YES	YES	YES	YES	5	0
2. Science laboratory available?	NO	NO	NO	NO	NO	0	5
3. Science HOD available?	NO	YES	YES	NO	YES	3	2
4. Practical activity conducted on the day of observation?	NO	NO	YES	YES	YES	3	2
5. Laboratory available?	NO	NO	NO	NO	NO	0	5
6. Lab manual available?	NO	NO	NO	NO	NO	0	5
7. Lab technician available?	NO	NO	NO	NO	NO	0	5
8. Time table slot for practical activities available?	NO	NO	NO	NO	NO	0	5
9. Laboratory equipment available?	NO	NO	NO	NO	NO	0	5
10. All learners participated in the practical activity?	NO	NO	YES	YES	YES	2	3
11. Learners are interested in Life Science practical activities?	PNC	PNC	YES	YES	YES	5	0
12. Subject head for Science available at the school?	YES	YES	YES	YES	YES	5	0
13. School located in urban area?	YES	YES	NO	NO	NO	2	3
Total						**30**	**35**
Mean						**2.5**	**2.9**

Key: PNC = Practical not conducted, Sch = School

Among the five schools visited for live classroom observations, two of them are located in urban area, while three of them are located in rural area. The geographical location of a school can affect the teaching of practical activities. Remarkably, if a school is located in rural area where the needed materials such as lime water, iodine solution, and food substances are not found, it is difficult for the teacher to improvise (Shikalepo, 2019, p. 6-8). Thus, Life Science teachers teaching in urban schools might have access to some practical materials more readily compared to those teaching in rural schools.

4.4. Findings from the interviews

One-on-one interview was held with a sub-sample of three Life Science teachers, three Head of Departments and three Principals during the follow- up data collection to answer the research questions.

During the interview, the participants were requested to share their opinions on the factors (challenges) affecting effective teaching of Life Science practical activities at their respective schools. The participants were also requested to comment on the measures which their schools have in place to enable the Life Science teachers to improve the teaching of practical activities. The responses obtained are as follow:

P1: "Yes, there are many factors in terms of the challenges that the school is facing which are affecting effective teaching of Life Science practical activities and these are generally due to lack of facility and resources like laboratory room, equipment and inadequate supply of materials". (P1)

P2: "We are facing challenges (negative factors) when it comes to effective teaching of practical activities in the school. These include lack of some laboratory equipment in the school and lack of capacity in administering the practical". (P2)

P3: "Yes, our school is in a big challenge as there is no laboratory at our school and there is a lack of science equipment and apparatus". (P3)

The responses from the principals revealed that the lack of laboratories, equipment and apparatus constitute the major factors affecting effective teaching of Life Science practical activities in their schools. According to Adedayo (2015), the lack of laboratory and laboratory facilities can negatively affect the teaching of practical work. When there are no laboratories and equipment at schools, it could mean that practical activities are likely not to take place and learners do not acquire the required knowledge and skills to tackle practical questions in examination (p. 4-7).

During the interview, the HODs also identified the following factors affecting the effective teaching of Life Science practical activities in their schools.

H1: "Even though I do not teach the subject I have realised that Life Science teachers are finding it difficult to conduct practical activities as there is no laboratory in the school. I think if there is fund provided by the government to procure teaching and learning materials, then some materials needed for practical activities can be purchased".(HOD1)

H2: "I teach practical once a week, the biggest challenge (or factor) affecting our school is the lack of laboratory equipment, and there is no laboratory at our school". (HOD2)

H3: "Our school does not have a laboratory and no equipment. The school is trying to buy equipment needed for practical activities in Life Science". (HOD3)

The responses by the Heads of Department complement those of the school principals. This assured the lack of laboratory and equipment as factors affecting effective teaching of Life Science practical activities in JSS the Okongo Circuit.

The teachers' responses during the follow-up interview were also recorded as follow:

T 1: "There is no laboratory to conduct practical activities at our school and there are no resources". (T1)

T 2: "The challenges that we are facing at our school include non-suitable conditions for conducting experiments. There is no laboratory at our school, and as result, teachers are sometimes forced to conduct practical activities in classrooms which are small in size, and the sitting arrangement does not support group learning. Forget about the laboratory, let us talk about simple chemical solutions and apparatus, there is nothing at our school, you can go and check in the storerooms; there is just nothing. Not even a simple iodine solution, litmus papers and test tubes. Improvising is the only option we are left with. Sometimes, some competencies in practical activities are omitted because they require chemicals and apparatus that most of the schools in Okongo circuit do not have. Unfortunately, there are no measures that are put in place to address these factors or challenges teachers are required to be creative and improvise I conduct practical activities three times per term". (T 2)

T3: "Yes, lack of laboratory facilities such as microscope, dialysis tubing, and lack of science laboratory". (T3)

During the live classroom observation, it was observed that, some teachers brought materials like food items for food testing practical from home. More importantly, some teachers were also observed showing their learners videos of practical activities on their smartphones.

All the teachers also corroborated with the principals and HODs on the factors affecting the effective teaching of Life Science practical activities in the study area. Nonetheless, it is heartwarming that despite the identified factors, the teachers are improvising and exploring other means to conduct few practical activities even though two to three practical activities per term is perceived inadequate for effective teaching of Life Science.

Literature has revealed that, the more the practical work conducted in Life Science subject, the more the learners understand the concepts being taught better (Nghipandulwa, 2011).

Research question 2: How can the Life Science teachers be assisted to improve the teaching of practical activities in Life Science at Junior Secondary Schools in the Okongo Circuit?

4.5. Measures that are put in place at schools to assist Life Science teachers to improve the teaching of practical activities in Life Science at Junior Secondary Schools in the Okongo Circuit of Ohangwena Region, Namibia

The excerpts below depict measures put in place to mitigate the factors affecting effective teaching of Life Science practical activities in Junior Secondary Schools in the Okongo Circuit

P1: “There are alternative measures that we put in place and always use to assist Life Science teachers when teaching Life Science practical activities. These alternatives include taking learners outside the classrooms for demonstration, dividing learners into groups of few learners to use the storerooms and school compound for some experiments. Sometimes, the school borrows equipment like the microscope from sister schools and circuits”. (P 1)

P2: “Despite these challenges or factors as you may call them, the school makes budgetary provisions to procure the required materials”. (P 2)

P3: “Yes, there are measures that are put in place to mitigate the factors affecting effective teaching of Life Science practical activities. They include fundraising activities such as school bazaar, lucky-draw, renting out the school tuck-shop etc. to raise funds to buy science some chemicals and equipment such as test tubes, solutions, petri dish, and droppers. Additionally, the school engage stakeholders to assist in erecting science lab and buying equipment.”(P3)

P3: Continues…

“Time also remains a big challenge in our school. All the subjects are allocated 40 minutes per lesson only on the timetable. Practical activities in science subject including Life Science requires more time. As a result, Life Science teachers in our school use the after school study time (afternoon study) to teach practical activities”. (P3)

HOD 2: “There are no measures that are put in place to mitigate the factors affecting effective teaching of Life Science practical activities in our school. Life Science teachers use word of mouth to explain practical activities”. (HOD2)

T1: “Currently, there are no measures that are put into place to mitigate the factors affecting effective teaching of Life Science practical activities in this school. Teachers sometimes use google search to search videos and show the experiment in the video to their learners”. (Teacher 1)

T1 continues……

“Sometimes Life Science teachers at our school use posters to draw structures for example of the external and the internal organs of the mammalian heart since there are no models available at the school”. (Teacher 1)

T2: “There are no measures that are put in place to mitigate the factors affecting the effective teaching of Life Science practical activities. The teachers are required to be creative and improvise”. When we improvise, we use locally available materials such as boxes, sticks, wires, food substances, glue, strings, plant leaves, seeds, plastic bags, candles, and food containers to do some sample experiments”. (Teacher 2)

T3: “The school sometimes tries to procure laboratory facilities but not enough, plans are in place from the regional offices to build standard science laboratory. The alternatives we are using include group activities, sending learners to make models/objects, and doing field observation”. (Teacher 3)

T3 Continues….. “Since there is no a uniform laboratory manual guide for Life Science practical activities in the circuit, teachers use the possible practical activities suggested at the end of each topic in the syllabus”. (Teacher 3)

Interestingly, most of the participants indicated that there are measures put in place at their schools to mitigate the factors affecting the effective teaching of Life Science practical activities. These measures include borrowing equipment like microscopes

from sister schools, purchasing few apparatuses with the little money available and use storerooms and school compound to conduct practical. Improvising with local materials is an important measure in addressing the identified factors affecting effective teaching of Life Science practical activities in the study area.

Given the fact that there is no provision of timetable slot for the teaching of Life Science practical activities, instead, the teachers use the theory lesson timetable slot to teach practical activities. This has implication for the time available to cover both the theory and practical teachings prescribed by the syllabus. In their study on the Factors affecting the effective teaching of practical work in Ethiopia, Daba and Anbesaw (2016), suggested that the teaching could be improved by launching science education whereby Life Science teachers are upskilled on how to conduct practical activities and how to improvise effectively.

A similar study conducted by Kasiyo, Denuga and Mukwambo (2017) in three selected schools in the Zambezi Region of Namibia, revealed that Natural Science teachers invariably improvise to get appropriate materials for a specific practical activity (p.2-8). For instance, in an experiment that requires little heating, the teachers use candle light if there is no burner available. Nghipandulwa (2011) opined that science teachers should be encouraged to improvise and if necessary, borrow equipment such as microscopes from sister schools. Principally, teachers improvise using local materials like sticks, wires, posters, and boxes etc. to make models for plants and animal cells, structures of the mammalian heart, female and male reproductive systems, and renal system.

In a different study, Mukhethoni (2019), reported that providing laboratories with adequate equipment, apparatus and chemicals could help to improve the teaching of

Life Science practical activities in schools. The provision of laboratory equipment was also identified in the current study as a measure for improving the teaching of Life Science practical activities in the Okongo Circuit.

4.6. Summary of the chapter

Chapter four presented and discussed the results of the study. These include important biographical information of the participants, factors affecting effective teaching of Life Science practical activities in Okongo Circuit. It further looked at measures that are put in place to assist Life Science teachers to improve the teaching of practical activities in Life Science at Junior Secondary Schools in the study area. Next chapter will represent the summary, conclusion and recommendations of the study.

CHAPTER FIVE: The findings, conclusion, and recommendations

5.1. Introduction

Chapter five presents the summary, conclusion and key recommendations of the study.

5.2. Summary

The study investigated the factors that are affecting effective teaching of practical activities in Life Science in Junior Secondary Schools in the Okongo Circuit. Furthermore, the study investigated how the Life Science teachers could be assisted to improve the teaching of practical activities in Life Science at Junior Secondary Schools in Okongo Circuit, Ohangwena Region.

Mixed methods research design was used in this study, and employed questionnaires, observation guide, and interview guide to collect data. Participants were selected using purposive sampling in ten schools that offer Life Science in Okongo Circuit. Thus, the study sample consist of ten Principals, ten Head of Departments and ten Life Science teachers. Descriptive statistics was used to analyse the quantitative data and presented them using tables and graphs while thematic analysis method was used to analyse the qualitative data.

According to participants (school Principals, Head of Departments, and Life Science teachers), lack of laboratory and laboratory equipment constitute the major factors affecting effective teaching of Life Science practical activities in JSS in the Okongo Circuit. The participants indicated that they were not exposed to training workshops on how Life Science teachers should conduct practical activities. Life Science teachers do not have the necessary skills to conduct practical activities.

According to the participants, Life Science subject has a large syllabus to cover. As a result, practical activities are oftentimes neglected as teachers mostly focus on theory lessons to complete what is expected at the end of the semester or academic year.

Life teachers further indicated that they do not receive support from their supervisors and are left alone to improvise on whatever they know. Nonetheless, such improvisation was exigent for the teachers as the majority of the schools are in rural areas with limited access to materials.

There is no uniformity laboratory manual to guide Life Science teachers on how to conduct practical activities. Thus, each teacher tries to teach practical activities according to his/her own understanding. The participants implied that their schools lack fund to procure apparatus and laboratory equipment needed to effectively teach Life Science practical activities. Furthermore, the schools have no laboratory technicians as there are no laboratories in the schools.

Among the measures to improve the teaching of Life Science practical activities in the study area, the teachers often borrow equipment such as microscopes from sister schools and circuits. Teachers use local materials such as boxes, sticks, wires, food containers, glue, strings, plant leaves, seeds, plastic bags, candles, posters, and food substances to carry out practical activities. Some teachers raise funds through school bazaar, sport tournaments, and lucky draws to procure simple equipment like test tubes, solutions, petri dish, and droppers to allow them to conduct some practical activities as they do not have these equipment. Equally, , the Life Science teachers use afternoon studies to teach practical activities since the time slot allocated in the school timetable is not adequate for both theory and practical lessons.

Other measures put in place to support the Life Science teachers to improve the

teaching of practical activities in the study area as follow:

1. Some schools use storerooms and school compound to carry out practical activities (learners go out of the classroom to do practical observations).
2. Some schools borrow laboratory equipment from sister schools/circuits.
3. Some teachers use the internet to Google videos of certain experiment and show them to their learners.
4. Sometimes, posters are used for presentation during practical.

5.3. Conclusion

This study investigated the factors affecting effective teaching of practical activities in Life Science in Junior Secondary Schools in Okongo Circuit in Ohangwena Region. The identified factors affecting effective teaching of Life Science practical activities in the schools include lack of; science laboratory, laboratory equipment, apparatus, and uniform practical manual for the schools. The location of schools in rural areas, large syllabus content, and lack of capacity building, and workshop for Life Science teachers on how to carry out practical activities also have a negative impact on the effective teaching of Life Science practical work. These factors negatively affect the effective teaching of practical activities which results in poor academic performance of learners in examination. To enhance the teaching of practical activities in Life Science, the teachers usually improvise to carry out some practical activities and they borrow equipment from sister schools and circuits.

5.4. Recommendations

The following are recommendations that were made based on the findings of the study.

The Ministry of Education Arts and Culture should provide JSS in Okongo Circuit with well-equipped Science laboratories to enhance effective teaching of Life Science practical activities by the Life Science teachers in the study area.

Training workshops on how to carry out Life Science practical activities should be organised regularly to build the capacity of Life Science teachers in Okongo Circuit to efficiently teach practical activities.

It is necessary to supply the Life Science teachers with a uniform practical activities manual to guide them to teach the same practical activities across all the schools.

Laboratory technicians should be recruited in all the Junior Secondary Schools to assist Life Science teachers with the planning and administration of practical activities.

The schools should engage with the stakeholders (teachers, parents, churches, businesses, and philanthropic organisations) to solicit support for the building of science laboratory and buying of science equipment.

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Below is the list of attached documents that were relevant in requesting permission and permission granted in the successful completion of this study. Among others: Clearance Certificate, Research letter, and a permission letter from the Director of Education Arts and Culture Ohangwena Education Directorate. Research instruments that were used to collect data are also attached.

Appendix 1:

Table 3: Responses from Life Science teachers (N=10), HODs (N=10) and Principals (N=10)

Factors	**Life Science teachers %**	**HODs %**	**Principals %**	**Average %**
Lack of time slot	100	100	0	60
No equipment	100	100	100	100
No laboratories	100	100	100	100
Not interested	0	0	0	0
No lab manuals	100	100	100	100
I do not have practical skills	50	62.5	30	47.5
Lack of support by supervisors	30	37.5	0	22.5
Too much work to cover	60	75	40	58.3
Lack of funds	40	50	30	40
My class is too large to conduct practical activities	60	75	0	45
No electricity in my school	30	37.5	30	32.5
The school is located in a rural area	80	75	80	78.3
No lab technicians	100	100	100	100
No workshop training received on how to carry out practical activities	80	100	60	80
Poor attitudes of learners towards practical activities	0	0	0	0

Appendix 2: Research ethical clearance certificate

ETHICAL CLEARANCE CERTIFICATE

Ethical Clearance Reference Number: KMC0010 Date: 11/04/2023

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: FACTORS AFFECTING EFFECTIVE TEACHING OF LIFE SCIENCE PRACTICAL ACTIVITIES IN JUNIOR SECONDARY SCHOOLS IN OKONGO CIRCUIT, OHANGWENA REGION

Principal researchers: PUYE HAILONGA

Staff Number/ Student number: 201503899

Remarks: This ethical clearance is granted with the preconditions that the student provides more space for the respondents to answer questionnaire question 7 (7. In your opinion, what are the possible solutions to the challenges that are hindering the effective teaching of practical activities in Life Science?) And also to correct the spelling of "Okongo" on the proposal's title.

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 Decentralized Ethics Committee)

_____

Prof. Davis Mumbengegwi (Head, Multidisciplinary Research)

Appendix 3: Research permission letter

CENTRE FOR RESEARCH SERVICES
Office of the Pro-Vice Chancellor: Research, Innovation & Development
University of Namibia, Private Bag 13301, Windhoek, Namibia
340 Mandume Ndemufayo Avenue, Pioneers Park, Office F223 - Fblock, Second Floor
☎ +264 61 206 4673; E-mail:kmbulu@unam.na; URL: http//www.unam.edu.na

UNAM
UNIVERSITY OF NAMIBIA

RESEARCH PERMISSION LETTER

Date: 08/05/2023

Student Name: Puye P Hailonga

Student Number: 201503899

Programme: Master of Education (Science Education)

Approved Research Title: Factors Affecting Effective Teaching of Life Science Practical Activities in Junior Secondary Schools in Okongo Circuit, Ohangwena Region

TO WHOM IT MAY CONCERN:

I hereby confirm that the above-mentioned student is registered at the University of Namibia for the programme indicated. The proposed study met all the requirements as stipulated in the University guidelines and has been approved by the relevant committees.

The proposal adheres to ethical principles as per attached Ethical Clearance Certificate. Permission is hereby granted to carry out the research as described in the approved proposal.

Best Regards

Dr. AEE Shikongo
Head: Postgraduate Research Support Services
Tel: +264 61 206 3129
E-mail: aeshikongo@unam.na

CENTRE FOR RESEARCH SERVICES
Office of the Director
2023 -05- 08
University of Namibia
UNAM

Appendix 4: Letter to the Director of Education, Ohangwena Region

Private Bag 13301,340 *Mandume Ndemufayo Ave, Pionierspark, Windhoek, Namibia*

Fax: 2063806 Tel: +264 (0) 61 206 3129

Dear Dr Hamatwi

Re: Request to conduct a research study at selected schools in Okongo Circuit Ohangwena educational region

I am Ms PUYE P HAILONGA, a registered Master of Science Education student at the University of Namibia. Conducting a research is partial requirement for Masters by course work course at the University of Namibia. I have drafted a proposal titled "Factors affecting the effective teaching of practical activities in Life Science subject in selected schools in Okongo circuit" that was approved by the University's School of Higher Degree Board.

It is against this background that I request your good office to grant me a permission to carry out my study. Patiently waiting for your response.

Yours truly

…….

MS PUYE P HAILONGA (Life Science teacher at Kongo Combined School)

Appendix 5: Permission letter from the Director of Education, Ohangwena

REPUBLIC OF NAMIBIA
OHANGWENA REGIONAL COUNCIL
DIRECTORATE OF EDUCATION, ARTS AND CULTURE

Office of the Director
Tel: (+264) 65 290200
Fax: (+264) 65 290224
Enquiries: Mirjam N N Nambahu
Email: ndapewa.nambahu@gmail.com
Our Ref: 13/2/9/1

Harelbecke Street, Greenwell Complex Building
Private Bag 88005
EENHANA

16 May 2023

Ms. Puye Hailonga
Student No: 201503899
University of Namibia

SUBJECT: REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN OHANGWENA REGION

1. Receipt of your letter received on 08 May 2023 is hereby acknowledged.
2. Be informed that permission to collect data for research from selected schools in Okongo circuit, Ohangwena region has been granted under the following conditions and request:
   - The data to be collected should only be used for the completion of your studies.
   - You have to liaise with the concerned Principals to make prior arrangements before the date of the research.
   - No other data should be collected other than the data stated in the request.
   - You may share the final report of your study with the directorate.
3. It is trusted that you will find this arrangement in order while wishing you all the best with your studies.

Yours Sincerely,

Ohangwena Regional Council
Directorate Of Education Arts and Culture
Office of the Director
17 MAY 2023
Tel: 065-290 2[illegible] • Fax: 065-290 224
P/Bag 88005 • Eenhana
REPUBLIC OF NAMIBIA

17/05/2023

ISAK HAMATWI
DIRECTOR

Region

Appendix 5: School Principal's consent form

I,----------the principal of _____school granted permission to Ms PUYE P HAILONGA to conduct her research study "Factors affecting effective teaching of practical activities in Life Science in selected schools in Okongo circuit" at our school. I understand information that will be gathered will be kept confidential and professionalism will be practiced at its highest level. She indicted teaching and learning plus extramural activities of the school remain the first priority so therefore no disruptions will be observed.

_____ (school principal) school stamp

_____

Appendix 6: Participant's consent forms

PARTICIPANTS CONCENT FORM

I _____(participant's Full Name) in full support and participating in Ms Puye P Hailonga's study about " Factors affecting effective teaching of practical activities in Life Science in Junior Secondary schools in Okongo Circuit Ohangwena Region".

I am well informed about the following;

- The purpose of the study which is to identify factors affecting effective teaching of practical activities in Junior Secondary Schools in Okongo Circuit of Ohangwena Region and also to find out possible remedies.
- Participating in this study is voluntary; there is no any form of reward up completion of survey questionnaires and interviews.
- Participants have the right to withdraw from this study at any stage of the process if they feel uncomfortable.
- Information shared by the participants will be kept confidential.
- Teaching and learning will be considered the first priority therefore the researcher will make sure her study does not affect lessons and other school related extra-mural activities.
- Participation in this study is highly appreciated, responses, suggestions and recommendations from all participants will be highly considered.

Participant's signature: _____ Date: _____

Appendix 7: Questionnaires

QUESTIONNAIRE

Dear Participant

1. My name is PUYE HAILONGA, student number 201503899. I am studying towards a Masters of Education degree at the University of Namibia (UNAM), and I am conducting a survey about Factors affecting effective teaching of practical activities in Life Science in Junior Secondary schools in Okongo Circuit Ohangwena Region.
2. I have selected you to participate in my study, because you belong to the group of people I want to include for my research. I would therefore like to invite you to complete this questionnaire.
3. The research I am conducting has been approved by the UNAM Research Ethics Committee. I would appreciate it very much if you would complete this questionnaire, and I would like to assure you of the following:
    a. You do not have to fill in this questionnaire if you do not want to.
    b. You can stop filling in the questionnaire and stop participating at any time if you want to, and there will be no negative consequences for you.
    c. Your participation is completely anonymous. This means that, even if I ask information that might identify you or if I know you, I am not allowed to make your identity known to anyone. When I report on my questionnaires' data and results, I will not mention any personal information about participants that might identify them.
    d. All completed questionnaires and data will be stored in a safe and secure place, and only authorized University officials, my supervisor and I will have access to it. After five years, all the questionnaires and data will be destroyed in an environmentally friendly way.
4. If you have any questions about this questionnaire, or if you do not understand anything, please feel free to ask me, and I will be happy to explain it to you.
5. If you want to know more about the research I am doing, please feel free to ask me, and I will be happy to tell you more.
6. It should take about 15 minutes for you to complete the questionnaire.
7. You can reach me on my cell phone at +264 815577580, or send an e-mail to puyepenefina@gmail.com
8. If you want more information about the study *you can contact (**PUYE HAILONGA 0815577580**) or Centre for Research & Services at kmbulu@unam.na* if *you have any further queries about the study or* **if** *you have any concerns or complaints that have not been adequately addressed by the research team.*
9. Thank you very much for your willingness to participate in this research!

Please detach this page and keep it.

Please turn over to start filling in the questionnaire.

Questionnaire

School Name (false name; a letter provided by the researcher): _____

This Questionnaire aims to collect information on the factors affecting the teaching of practical activities in Life Science at selected schools in Ohangwena Region, Namibia and possible solutions/recommendations that could be implemented to improve the teaching of the practical activities.

Instruction

Please mark [X] in the appropriate box.

Questions

1. Position at school: Principal ☐ HOD ☐ Teacher ☐
2. Gender Male ☐ Female ☐
3. Highest qualification obtained: Certificate ☐ Diploma ☐ BED. (Hons) ☐ Master degree ☐
4. Years of teaching experience: 1-5 years ☐ 6-10 years ☐ 10years and more ☐
5. How often do you teach practical activities?

   Every day ☐ once a week ☐ twice a week ☐ three times a week ☐ Never ☐

6. From the issues listed below, choose all the challenges that hinder you from teaching practical activities in Life Science subject in your school. You can mark more than one response.

a) Lack of time slot ☐

b) No equipment ☐

c) No laboratories ☐

d) Not interested ☐

e) No lab manual ☐

f) I do not have practical skills ☐

g) Lack of support by supervisors ☐

h) Too much work to cover ☐

i) Lack of funds ☐

j) My class is too large to conduct practical activities ☐

k) No electricity in my school ☐

l) The school is located in a rural area ☐

m) No lab technicians ☐

n) No workshop training received on how to carry out practical activities ☐

o) Poor attitudes of learners towards practical activities ☐

p) Other challenges(please specify in the space below)

_____
_____
_____
_____
_____
_____

7. What are the initiatives or strategies put in place in your school to support the teaching of practical activities in Life Science? Please list them below.

_____
_____
_____
_____
_____
_____
_____

8. In your opinion, what are the possible solutions to the challenges that are hindering the effective teaching of practical activities in Life Science?

_____
_____
_____
_____
_____

Appendix 8: Interview guide

Interview guide

Interview questions (Life Science teachers, HOD and School principal)

Name of interviewer: _____

Name of interviewee (false name) _____

School Name (false name) _____

This interview aims to solicit information on the factors affecting the teaching of practical activities in Life Science at selected schools in Ohangwena Region, Namibia and possible solutions/recommendations that could be implemented to improve the teaching of the practical activities.

1. What is your position at the school level?

   _____
   _____
   _____

2. How often do you teach practical activities in Life Science at your school?

   _____
   _____
   _____

3. Are there challenges you are facing when teaching Life Science practical activities at your school? If yes, what are they?

   _____
   _____
   _____
   _____
   _____

4. Are there measures that are put into place to overcome the challenges that you may face when teaching practical activities in Life Science?

   _____
   _____
   _____
   _____
   _____

5. What are your recommendations/suggestions to address the challenges affecting the teaching of Life Science practical activities at your school?

Appendix 9: Observation guide

OBSERVATION CHECK LIST

Name of school (False name, a letter allocated by the researcher)

_____

Are the following available at the school?

Please mark(X) in the appropriate box.

Elements	Yes	No
1. Life Science teacher available?		
2. Science HOD available?		
3. Practical activity conducted on the day of observation?		
4. Laboratory available?		
5. Lab manual available?		
6. Lab technician available?		
7. Time table slot for practical activities available?		
8. Laboratory equipment available?		
9. All learners participated in the practical activity?		
10. Learners are interested in Life Science practical activities?		
11. Subject head for Science available at the school?		
12. School located in urban area?		
	Total YES_____	Total NO_____