An Exploration of educators' perceptions of the implementation of Life Sciences practical in Grade 10 and 11 examinations in the Capricorn South District, Limpopo Province, South Africa

By

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DECLARATION

I thus proclaim AN EXPLORATION OF EDUCATORS' PERCEPTIONS OF THE IMPLEMENTATION OF LIFE SCIENCES PRACTICAL IN GRADE 10 AND 11 EXAMINATIONS IN THE LEBOWAKGOMO DISTRICT is my personal work, authored in my own phrases; all the sources utilized have been listed and credited with a thorough reference list.

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ABSTRACT

The revised Basic Education curriculum has a significant influence on learning, teaching, and evaluation of Life Science in the laboratory or classroom. Practical examination must be an element of classroom teaching, learning, and evaluation in Life Sciences, according to the policy statement. However, there is still a lot of uncertainty about how educators perform practical examinations in their classes. This study investigated perceptions of Grade 10 and 11 Life Sciences educators on the practical assessments specifically the examination they are supposed to administer, as well as how they implement these exams and their experiences about their implementation.

Rogan and Grayson's (2003) concept of curricular implementation were employed to frame this research. The implementation profile and capacity to innovate led the data analysis and research instrument for this study. An interpretive paradigm guided the application of a qualitative case study. To find respondents, both purposive and convenience sampling were employed. Educators at purposefully selected schools in the Lebowakgomo District were surveyed using a free -form or open-ended questionnaire.

According to the findings of this study, educators do conduct practical examinations, but they have four fundamental attitudes regarding these assessments. Practical exams, according to educators, increase learners' attention, aid in managing learners' behaviour in class, allow learners to be hands-on, and encourage learning of Life Sciences. However, an overwhelming 98 percent of educators had a negative perception of the practical examination implementation or had had negative experiences with it, with just 2 percent having positive perception. Because this positive perception is based just on one element, "Learners take practical examination seriously," the positive perception might also be perceived negatively.

Educators' negative perceptions stem from a variety of issues, including a lack of resources for practical examination implementation, big classrooms, a lack of support from schools and parents for successful implementation of Life Sciences practical examination, and, finally, a lack of training in the implementation of practical work in general. There is a disconnect between the curriculum and the actual educators practice when they implement practical examination. The study found that practical

examination implementation is poor and insufficient for effective teaching and learning. This study recommends that to improve practical examination implementation in schools, the government, the School Management Team (SMT), educators, communities, and other stakeholders must work together (Kibret & Adem, 2020).

KEY CONCEPTS

Practical examination: can be defined in a variety of ways. Pillay's (2004) concept will be applied to this study. Pillay (2004) defined practical examination as all activities involving scientific method that take place in the classroom, laboratory, or even the kitchen/garden. They can be both integrated and basic science process abilities. It is not limited to the laboratory; it is heavily reliant on the ability of educators to improvise and create.

Integrated process skills: involve hypothesizing, translating data, controlling variables, formulating models, defining operation, critiquing experimental designs, and designing experiments (Duggan & Gott, 2005).

Basic process skills: Inferring, recording, observing, measuring, and classifying information are all basic process abilities (Padilla, 1990).

Hypothesis testing: The process of executing tests based on educated estimates based on observation, prediction, and framing of a question. (Isacc, 2015).

Process skills-: science process is described as transferable abilities to various science disciplines they reflect scientist behaviour. Process skills involves scientific and critical thinking as well as scientific methods (Padilla 1990).

Minds on it is a hypothesis testing of a hypothetical problem that involves critical thinking, data translation as well as problem solving skills (DoE, 2011).

Hands on: It entails manipulating materials through actual actions to examine and solve problems (DoE, 2011). It's also known as "doing" learning (Samaneka, 2015).

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BACKGROUND AND MOTIVATION

1.1 INTRODUCTION

South Africa's curriculum has developed since the country's first democratic elections in 1994 to promote the significance of education (Phasha, Bipath & Beckmann 2016). Between 2006 and 2012, the Life Sciences curriculum was updated twice, with the subject that was formerly known as Biology being renamed to Life Sciences in Grades 10 to 12 in the Further Education and Training phase (FET), Life Sciences also forms part of Natural Sciences in the (GET) General Education and Training phase. As new material and process knowledge were brought into the curriculum during these revisions (Jansen 1998), the underpinnings of what constituted Life Sciences were questioned. Added to the two theory examination papers is now a formal practical examination, which is mandatory in the Curriculum Assessment Policy Statement (CAPS) and Life Sciences Curriculum. This means that in Grades 10 and 11, a mandatory practical exam is part of the Life Sciences curriculum, and its implementation is therefore critical.

Introduction of Life sciences practical examination meant new developments in the curriculum. Nobody paid much attention to the challenges that may be encountered until it was done (Jorgenson, 2006). Years later, after the practical examination was fully introduced both in the independent schools and public schools’ challenges rings true. Educators' impressions of the practical assessment and curricular change have been shown to be formed not because they lack the desire or capacity to improve, but rather because they value their independence and are concerned about their rising workload and time constraints.

Educators were insufficiently trained to implement the new curriculum regardless of the need for them to be highly knowledgeable about effective curriculum reform and its implementation (Lieberman & Mace 2008). The lack of curriculum implementation training received by Life Sciences educators contributed to their ambiguity about their job, topic understanding, and pedagogical knowledge (PK) and competence (Onwu, Botha, De Beer, Dlamini & Mamiala; 2016). To elaborate, Cronje (2011) maintains that many high school educators are underqualified and not well prepared to implement the curriculum according to desires of curriculum designers, hence their struggle in planning, preparation, and completion of their work schedule.

South African educators lack a basic comprehension of science topics, which contributes to learners' poor performance (Onwu et al., 2006). Ngema (2016) cites curriculum change, time allocation per Life Sciences topic, educators' teaching load as the most contributing factors to learners' low performance going hand in hand with educators' lack of specific topic competence, resources, medium of teaching, poverty, parent engagement, and motivation. Many educators, according to Cronje (2011), struggle to improvise when laboratory equipment is not available, or they may not know how to set up and execute practical activities even when all the necessary resources are present. This may have an impact on how practical examinations are carried out and, as a result, poor learner performance.

Secondary schools, as well as colleges and further education institutions in South Africa, poor performance in Life Sciences and low enrolment rates in science subjects represent a threat to the country's economic progress (Muzah, 2011). Investigations on the reasons behind learners' low performance must be conducted to improve secondary school pass rates. South Africa must also change its Life science educational policies by replicating the highest achievers' educational systems through worldwide comparison tactics (Lemmer & Van Wyk, 2010).

South African education system is focused on testing learners for the system merits and producing good matric results for educational districts to be recognised as either good performing or having poor education (Muzah, 2011). Matric results differ from grade 10 and 11 learner's performance (Ramaroka, 2007). The so regarded as best educators are concentrated in matric with little or no best educators in the lower grades. This has negative influence in learner's performance and makes it difficult for learners to use experiences they gained by attending their science lessons in their real-life situations.

Learners fail to relate some topics learnt theoretical in their Life Sciences classroom without some practical work done for further understanding of key terms. Some topics needs practice more than the other, for example it is easier to teach Mitosis topic if you show learners how replicated chromosomes separate into two new nuclei than to just tell learners how it happens. Therefore, combination of both theory and practice could yield and improve learners' results. Learners' prior knowledge should also be utilized to assist them in comprehending Life Sciences subjects and allowing them to create their own experiences inside the classroom.

Regardless, the status of practical examination as assessment strategy in South African education is not clear. Assessment should be a planned process that continuously identify, gather, and interpret information about learner's performance. Assessment should further involve (1) generation and collection of evidence for learner's performance, through different tasks presented to an educator. (2) assessment should evaluate collected evidence, when educators use marking guidelines to mark learners' answers to get a mark that will indicate learners understanding of a topic covered by assessment. (3) recoding of learner's marks, this is track learners progress and to make note of aspects that learners answered poorly. This can also help in the improvement of the teaching and learning process by using poorly answered questions to redo these topics, providing opportunities for learners to improve (4) the latter occurs during teaching a topic to improve learners understanding of the next stage for the same topic. (DBE, 2011).

When designing practical tasks educators disregard the above requirements instead, they put certain focus by only using cookbook and demonstrations rather than to incorporate all the seven skills required by Curriculum Assessment Policy Statement (CAPS) under specific aim number two for performing of actual practical examination. In many cases practical examination question papers are pre-set by district offices, educators have little or nothing to do with its designs, most of those question papers that comes from the district does not allow learners to handle any equipment or apparatus for example, they only require of them to follow instruction, record information, and interpret information without making any observation, measuring anything, or designing/ planning any investigation.

Life Sciences educators face many perceptions during the implementation of the curriculum (Santangelo & Tomlinson, 2012). It is those perceptions that hinders a successful curriculum implementation. Perceptions are defined as a point of unsettled matters that have influence in decision making (Hornby, 2003). Implementing the curriculum ideals with negative perceptions will render the curriculum less important for social development of individuals, that will in turn not allow grasping of issues encountered during Life Sciences curriculum implementation.

There are many different perceptions regarding the implementation of Grade 10 and 11 Life Sciences practical examination. Those perceptions are caused by among other factors teaching methodology, teaching, and learning processes, educators training, recognition of educator's service by government etc. These beliefs contribute to opposition to the use of practical examinations in Life Sciences in Grades 10 and 11, even though the design of the Life Sciences curriculum mandates their use in Grades 10 and 11 to meet curriculum ideals.

The aim of this study was to find out how educators in Limpopo's Lebowakgomo District felt about Life Sciences practical being included in Grade 10 and 11 exams. For the successful application of CAPS and achieving curricular criteria, pedagogical content knowledge is essential (PCK). It became evident from the literature review that little research had been done on educators' perceptions of the practical examination in Life Sciences.

1.2 PROBLEM STATEMENT

For implementation of practical examinations to be successful, a dedication to building capacity in the delivery of high-excellence teaching and learning is essential (Department of Basic Education 2011). Learners ask questions to gain a better understanding of their subject. They look for more knowledge online (Deore 2012), in books (Ward, Roden, Hewlett & Foreman 2005), and from experts (Harlen 2018). The investigation of phenomena in the life sciences is the emphasis of Specific Aim 2 (SA2), which is divided into seven sets of competencies that learners must possess before starting a practical assessment. These skills include the learner's capacity for observing patterns, using tools, and following instructions. At each level of the learning cycle, formative assessment should be used to gauge learners' progress (Hodson 1992). Once the cycle is finished, educators are required to give summative evaluations to assess the learner's achievement. The experience of giving practical exams at school, on the other hand, is now overwhelming for educators due to the shortage of laboratories, science equipment, and other resources. As a result of their simplistic views of practical activity, many find practical assessments intimidating (Mudau & Tabane 2014). Because of these preconceptions, educators don't conduct practical examinations (Kibirige & Hlodi 2013) or, if they do, they do so use a "cookbook" method (Mudau & Tabane 2015). The "recipe practical" or "cookbook" method does not further scientific understanding (Sani 2014). Although most educators concur that practical exams are a crucial and successful teaching tool for the life sciences (DiBiase & McDonald 2015), they still lack the knowledge and expertise to put it into practice. Therefore, the purpose of this study was to understand Life Sciences teachers' perceptions in the Lebowakgomo region about the introduction of practical assessments in Life Sciences.

1.3 PURPOSE OF THE STUDY

The goal of this study is to find out how Life Sciences educators in Grades 10 and 11 feel about the adoption of practical exams in Life Sciences.

1.4 RESEARCH PROBLEM

The overall question that directed this study:

- What are the perceptions of Grade 10 and 11 Life sciences educators towards the implementation of practical examinations?

Related research questions are:

1. How do Grade 10 and 11 Life Sciences educators conduct practical examinations?
2. What limitations have Grade 10 and 11 Life Sciences educators identified to be associated with practical examinations?

1.5 SIGNIFICANCE OF THE STUDY

By establishing educators' impressions of the application of practical assessments, this study will aid Life Sciences subject advisers and curriculum builders in identifying gaps, errors, and issues in curriculum delivery. This research will also give them important information on what is required to ensure that the new curricular principles are realized. Furthermore, the experiences of Life Sciences educators should be used to improve the curriculum. The findings of this study will assist the researcher in engaging in personal reflective practice to achieve a more nuanced practice.

1.6 THEORETICAL FRAMEWORK

Rogan and Grayson's (2003) hypothesis provides the theoretical foundation for this study. This idea claims that when two constructs are employed to administer a curriculum, it results in the curriculum being implemented effectively (Mutembi; 2019). Rogan and Grayson's idea is based on literature (Herbel-Eisenmann, Wagner, Johnson, Suh, & Figueras, 2015), and is supported by theories such as Macayan (2017), Spady (1994), Fullan and Hargreaves (1991), Hargreaves and Hopkins (2004), and Verspoor

(2004). Because the perspectives of Grade 10 and 11 educators on the implementation of practical examinations, as well as their support and innovation experiences, are being investigated within the context of the CAPS Life Sciences policy, it is acceptable to base this study in these principles. The Rogan and Grayson frameworks were designed with the characteristics of a developing nation in mind, particularly South Africa (Mutembi; 2019).

Rogan and Grayson (2003) propose three connections between (1) curriculum implementation, (2) educators' potential to innovate during reform, and (3) the professional development or support educators get for curriculum implementation both within and outside the school (Sebotsa, De Beer & Kriek; 2019). The profile of implementation is a tool that may be used to analyse and communicate the degree to which curriculum's concepts are put into practice.

Rogan and Grayson's (2003) technique have already been implemented in several nations with under-resourced or even well-resourced schools (Altinyelken; 2010). The profile's goal is to show a map of the learning area as well as possible paths to other destinations. It can also assist school curriculum planners in regulating their present strengths. The Rogan and Grayson sub-constructs are (1) the use and type of science practical examinations, (2) the form of classroom collaboration, what the educator does and what the learners do, (3) the integration of science/mathematics in society, and (4) evaluation processes.

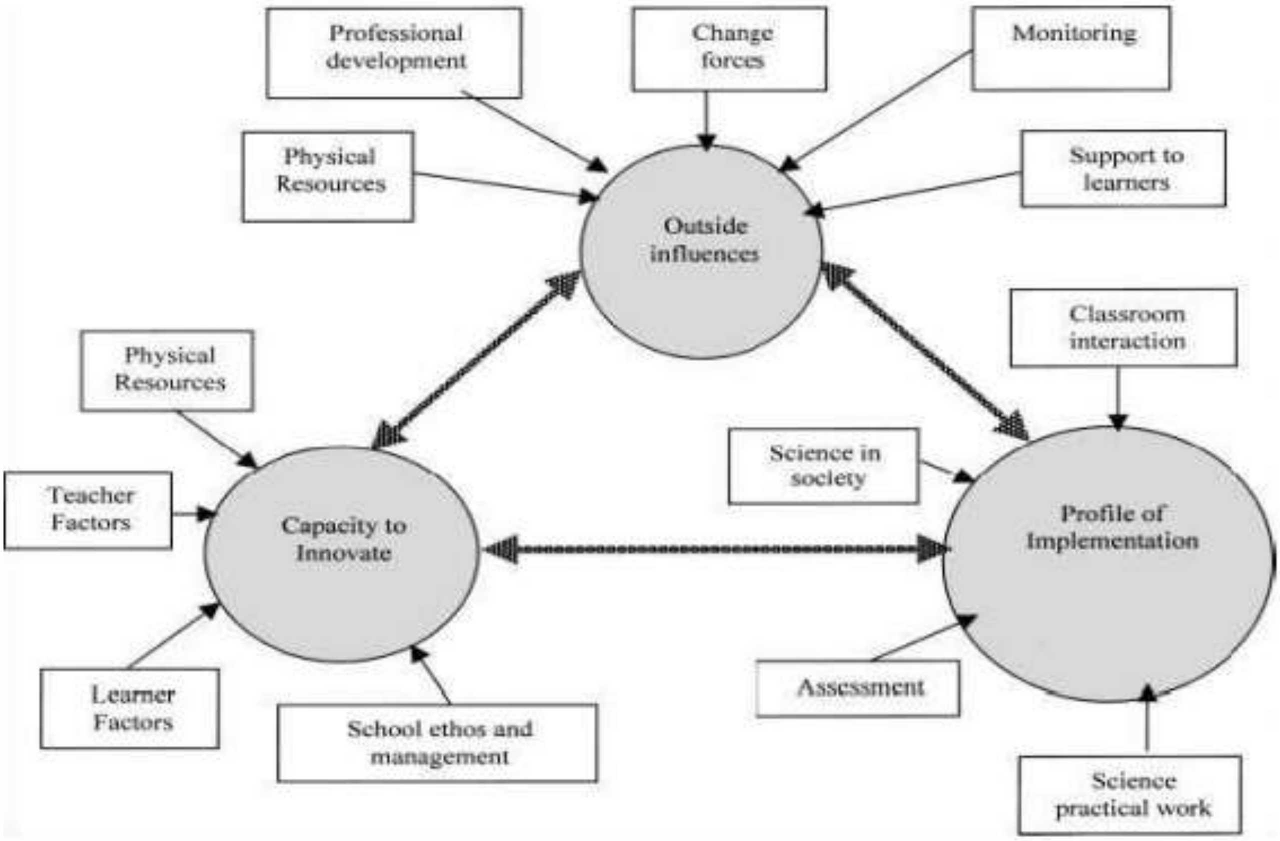
The construct ability to innovate tries to clarify the factors that can help or hinder the adoption of new practices or ideas in school systems. The profile of implementation can be used to comprehend, communicate, and analyse how well curriculum ideals are implemented. Recognizing that curriculum implementation is not an all-or-nothing issue is critical to the implementation profile. The key to curriculum implementation, according to Altrichter (2005), is to conceptualize levels for implementing the curriculum. It allows subject advisers in schools to assess their school's capabilities and pick a path to successful curriculum implementation. Curriculum implementation is a long-term process in which educators and other school stakeholders decide where to start and how rapidly to move forward.

Because of the profile of implementation, many members of the school community may participate to the formulation of implementation plans and processes that are appropriate and practical for each school's setting and culture (Hargreaves & Hopkins, 2004). The method to curriculum implementation is quite like the concept of school development planning. It also justifies prioritizing concerns because not everything can be done in a single year's growth strategy.

Practices described at each sub construct of profile of implementation are phrased positively. There is likely possibility that some schools or educators does not exhibit any of the characteristics described by these subconstructs. But the point of curriculum implementation profile is to elicit positive practices that are happening at any level, not to only focus on deficit.

The capacity to innovate profile is an attempt to gain a better understanding of the elements that help in the execution of practical tests in schools. It also acknowledges that not all schools will be able to implement a particular innovation. Educator factor, physical resource, school ecosystem, learner factor, and management are examples of subconstructs, as shown in Appendix K.

The construct outside influence is meant for description of the kind of actions taken by external organisations and their intentions. According to this study, there are agencies or organizations outside of schools, such as the Department of Basic Education, that connect with schools to facilitate innovation. The three constructs for the framework (implementation profile, outside influences and capacity to Innovate) are shown below in Figure 1.



(Rogan & Grayson 2003)

Figure 1: Framework of curriculum implementation

This research focused on the practical examination's implementation (the implementation profile) in the Life Sciences; therefore, it's concerned with the assessment and practical examination sub-constructs. Learning objectives can only be reached with a uniform and reliable assessment method, practical examination provides educators with learner performance data to measure teaching effectiveness. Ineffective implementation of practical examination will give wrong results about learner performance and less proficient in the acquisition of practical skills (Saurabh, Patel, Khatun, Chaudhri & Patel, 2021).

Negative perceptions make educators to give learners marks by luck and practical examination to be less trusted. Practical implementations influence all sub construct including classroom practice together with all types of assessments that takes place resulting even from science practical work. Learning is assessment driven; therefore, the use of practical examination as formal assessment shows clearly that no single assessment method is self-sufficient (Glieder, Farinas & Arnold, 2002).

1.7 CONCLUSION

The research investigation was summarized in this chapter. In this chapter, the problem statement and the study's purpose were provided. It also contained the research topics, techniques, implication of the study, and theoretical framework. A relevant literature review will be presented in the following chapter.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter evaluates related content in connection to an assessment of educators' perspectives on Life Sciences practical in Grade 10 and 11 exams, in the Lebowakgomo District. This is done to give a theoretical framework for addressing the research questions and to meet the study's objectives.

2.2 PERSPECTIVES ON PRACTICAL EXAMINATION

The addition of a practical exam to the Life Sciences school curriculum marked a crucial element that set it apart from other secondary school subjects (Samaneka 2015). Many academics have contested the purpose, objectives, and goals of practical exercises in the secondary school Life Sciences curriculum (Millar and Hanks, 2017; Moeed & Hall 2011; Ramnarian 2011). Academics recognize practical examination as a crucial component in teaching Life Science ideas (Reiss & Abrahams 2015; Kibirige & Teffo 2014). Rogayan (2019) propose that Life Sciences practical activities have positive contribution to a learner’s performance, and they improve their approach towards the Life Sciences subject.

Learners attitude in relation to the subject can be a factor that influence their learning and achievement in the subject (At & Wekesa, 2015). Most curriculum reform embrace the importance of proper learning and pays little insight on the impact it may have on learners’ attitude and believe for their improved learning and achievement. When seeking to comprehend and explain learners’ accomplishment in Life Science, the main component to consider is the improvement of learner's attitude (Yapici, Aydin, Koç, Kanca & Yildiz, 2019).

Practical examination also gives learners an opportunity to observe or manipulate real materials during practical assessment (Millar, 2004). Recent research in practical examination in science subjects describe the influence the curriculum and method of assessment has on learner performance (Abrahams &Reiss, 2012). The learners are made aware of what is being assessed through practical examination. Learners' conceptual comprehension, procedural understanding, practical and process abilities will all be evaluated. To evaluate these abilities, a successful practical examination is required (Osborne, 2016).

Therefore, successful implementation of practical examination can enhance learners' experiences, skills, understanding as well as enjoyment of Life Sciences. Practical exam emphasizes, scientific methods, and learners gain thinking skills and allow them to act in a scientific manner. It further develops learners concept understanding, improve their problem-solving skills, and induce scientific attitudes (Tamir, 2020). Life Sciences practical examination help in developing instruments, apparatus, and equipment familiarity.

Practical examination needs to be implemented properly without any hinderances for learners to gain manipulative skills as well as expertise for reading different manner of scales. Learners can use results obtained through performing practical activities to gain much understanding of Life Sciences concepts (Manjit, Ramesh & Selvanathan, 2003). Educators can generate concretized abstract ideas through practical examination implementation, learners will gain first-hand knowledge. Practical examination also allows the challenging of primitive or neonate ideas (Faize, Husain & Nisar, 2017).

It teaches learners about scientific phenomena in an unspoken way (Collins, 2001). Learners are inspired to learn Life Sciences after taking a practical exam. It allows learners to manipulate equipment, giving them a better understanding of the subject's material. As a result, the practical exam should be the evaluation in which materials and equipment are meticulously assembled to persuade Life Sciences learners of the validity of scientific worldview.

As recent research shows that proper implementation of practical examination at secondary schools can make learners gain critical thinking skills (Ali, Toriman & Gasim, 2014). It also can allow them to be at the centre of their learning, by allowing them to participate in Life Sciences and not just being theoretical taught about it. Therefore, doing of practical work trigger learner's eagerness to know more about Life Sciences as a subject. The more learners keep themselves knowledgeable and eager to learn, the clearer they become with subject content.

Eagerness does not only help learners in excelling in Life Sciences, but it also can improve their memory and learning (National Research Council, 2001). Curiosity makes learners to be motivated, dopamine (Oudeyer, Gottlieb & Lopes, 2016). Dopamine is the greatest motivation one can have, for them to be naturally inclined to learn new content. Successful implementation of practical examination would mean success of Life Sciences as a subject, because as we know Newton discovered gravity when he was curious about the apple that fell on the ground not flying up (Cohen, 1981).

The reality however is that not all secondary schools are well equipped to implement practical examination, instead those schools tend to replace practical examination by performing some demonstrations (Ogunleye, 2010). Demonstration exercises are unproductive, they confuse learners, and they are ill conceived (Hodson, 1992). Since many schools lack laboratories, practical examination implementation is difficult for both educators and learners. Learners would understand better given an opportunity to perform practical examination by manipulation of laboratory equipment.

Demonstrations are considered the best choice by educators, because it allows them to comply with South African Schools Administration Management System (SASAMS) requirements (Christie, 2010). Demonstrations will at least give them something to record in their marksheets, “filling the spaces in the marksheets” (Agrawal, 2004). It needs to be noted however that those demonstrations are of little or no help to the learner’s acquisition of knowledge instead they rob them of an opportunity of performing the actual practical examination.

Educators have limited/ no time to plan and formulate ways in which they will implement Life Sciences practical. In most cases the department of education district offices pre-set practical examination question papers for Grade 10-12. If schools do not receive question papers for certain academic school term, Life Sciences educators make use of previous question papers from district offices (Lamborn, Newmann, & Wehlage, 1992). This makes learners to follow a fixed program of experiments, giving more advantage to the learners who repeat the grade, since they will be familiar with the question paper. During these examinations, learners have less manipulation chances, mostly they are expected to entirely observe an educator demonstrating or giving them ideas of how to respond to questions as they themselves are guided by marking guides, that is a cookbook style.

This research acknowledges an important role proper implementation of practical examination in Life Sciences can play in improving learner's performance in the South African secondary schools. And it posits that practical examination should be made central to classroom learning of Life Sciences, its implementation should be improved to attract and attain learners into the Life Sciences class. Observations and theoretical findings should be checked against experience (John, 2002). It is Life Sciences educators who hold keys to interchange all those ideas.

Secondary school educators correlate positively with their learners, that is seen through their matric examination results. The perceptions of educators, on the other hand, have been found to influence learners' achievement and learning (Ware, 1992). Conflicts cause perceptions, the dilemma educators whose schools has the laboratory find themselves in when they do not understand the practical while learners ask many questions as they get excited by the practical and eager to know more. Only knowledgeable and inspired educators would be willing to engage in such activities (Seyed Yousef, 2019). For educators to draw meaning out of practical examination they need guided higher-level abstraction. Educators' knowledge and inspiration relate to their own education as educators are also former school pupils.

Life sciences practical examination should be taking different form in secondary schools, *i.e.*, demonstrations, executions, laboratory experiments and field work. Educators' creativity could also introduce new experiments (Ndirangu, Kathuri, & Mungai, 2003). Virtual laboratories, which rely on the interplay of computers, movies, and the internet, are also being implemented in many South African secondary schools (Scheckler, 2003). Because every attempt should be made to promote learners' enthusiasm in studying Life Sciences, the focus of this study was on educators' viewpoints on practical examination implementation.

Practical assessment is widely recognized as a crucial component of Life Sciences teaching and learning (Toplis & Allen, 2012; Kibirige & Teffo, 2014). Practical examination looks to be a challenging issue with different definitions and competing purposes, according to the study (Abrahams, 2009). There is a related argument on where it should take place (Lunetta, Hofstein & Clough, 2007). Practical examination is important in the analysis of learner's conceptions of science and what constitutes Life Sciences practical examination and where it occurs.

According to Ottander and Grelsson (2006), practical examination in schools should take place in the laboratory. In the absence of a laboratory or sufficient equipment, Ottander and Grelsson (2006) limit practical examination to the laboratory and do not allow any innovation. This scenario is all too common in many under-resourced South African schools. As a result, this research cannot support such an author's concept of practical examination.

A practical examination, on the other hand, is defined as any scientific teaching and learning evaluation in which learners watch and handle apparatus (Millar, 2004). This is a hands-on approach of practical examination that includes manipulation of apparatus. Practical examination is considered by Millar and Hanks, (2017) as an important tool for assessment of experiment skills as well as learners' appreciation of science. Millar and Hanks, (2017) does not confine any practical examination to the laboratory or even school setting. Lunetta et al (2007) put a broader definition of practical examination by maintaining that it is learning experience where learners interact with equipment. Millar (2004) and Lunetta et al. (2007) both promote the idea of practical examination as a combination of hands-on and mind-on activities.

Practical examination has been discussed in the literature in various ways, such as experimental assessment or the evaluation of scientific findings (Ramnarian, 2011). Science Community Partnership Supporting Education (Score) (2009) referred to practical examination as practical assessment or investigative assessments, whereas Kibirige, Rebecca and Mavhunga (2014) referred to it as laboratory assessments. Regardless of the many definitions for practical examination, according to Hodson (1996), the purpose of practical examination is to test learners' comprehension of scientific investigations through independent science experimentation. Benner (2011) maintains that practical examination fosters practical skills development by assessing thoughts and processes that constitute performing of Life Sciences practical examination.

Alternatively, practical examination can be defined from perspective influenced by educational movement (Pekmez, Johnson & Gott, 2005). The idea of procedural understanding of practical skills and experiment behind the doing of science need to be assessed (Duggan & Gott; 2005). Learners can put their investigative skills to the test by taking a practical exam (Stoffels, 2005). It gives chances for learners to practice and build a variety of process skills through hands-on and mind-on activities. Those process skills include but are not limited to data analysis, testing hypothesis, data translation, data interpretation etc. In Stoffel's (2005) concept of practical examination, basic and integrated process skills take precedence. The concept of practical examination given by the Department of Basic Education in 2008 is aligned with researching movement viewpoints, and it includes both substantive comprehension and the development of problem-solving abilities.

Preceding idea shows that there is similarity between practical work and practical activities for what practical examination is. Practical examination is concerned with assessment of practical activities whilst the practical work includes practical examination, conducting practical activities/ experiments as well as the process approach etc (Millar and Hanks, 2017). This means practical examination does not separate theory from the actual doing of experiment. As a result, practical examination and practical work are inextricably linked. Learners can improve their investigative abilities and concept knowledge through both practical assessment and practical activity. They both cater for concept that needs to be known by learners as well as skills to be acquired for doing of science. There is no single way to conceptualise practical examination, conflicting ideas amongst researchers are necessary to view the purpose of practical examination and possible perceptions that educators may have (Herold, 2020).

As mentioned above, there are various definitions of practical examination in literature. As a result, practical examination and practical work are inextricably linked. Learners can improve their investigative abilities and concept knowledge through both practical assessment and practical activity. This would mean in a South African perspective, previously disadvantaged schools which lack suitable laboratory equipment cannot at all implement practical examination (Fonjungo, Kebede, Messele, Ayana, Tibesso, Abebe, Nkengasong & Kenyon 2012).

Practical examination has been defined by experimental activity (Ramnarian 2011), practical and inquiry activities (Science community Representing Education 2009), and laboratory research in the literature (Kibirige & Hlodi 2013). Nonetheless, according to Hodson (1996), practical examination is intended to help learners grasp scientific research by performing science. This study aligns itself with the later reference, since the researcher strongly believe that practical examination helps learners acquire essential skills that open doors to science as a profession.

Dewey (1986) thought that the individual has two sources of information. There is intuitive information (sometimes known as "gut" knowledge) that comes through one's interactions with the world, and there is knowledge that comes via practice. The primary characteristic of gut knowledge is that it establishes the individual's reality. Practical examination knowledge deals with formal look at the way of performing practical work.

It plays an important role in developing 21st century transferable skills needed by both universities and learner's future employers. Practical examination allows learners to comprehend and transform data by means of experience (Kolb & Kolb, 2005). It also helps to investigate learners' skills to ensure that learners gained knowledge that is relevant to the subject matter (Kolb & Kolb, 2005). The atmosphere must therefore be created by educators to progressively enhance learners' learning style (Kolb & Kolb, 2005). Planning and preparing for practical examination can be time consuming, finding space and resources can also be difficult since practical work should take place in a safe environment. It is important to detect learners' challenges in certain areas of Life Sciences by setting increasingly challenging exercises that will ensure effective use of practical work and practical examination and allow learner's growth during these learning processes. It is the focus of practical examination to promote learner development and strengthening their talents through educators' teaching style (Musasia, Abacha &Biyoyo; 2012).

In the context of South Africa, Stoffels (2005) defines practical activities as teaching and learning that allows learners to participate in the research process. This reinforces Lunetta et al (2007) statement that practical exercises are both hands-on and mind-on, and that they allow learners to grow by practicing multiple process skills. Observing, recognizing, testing the hypothesis, predicting, translating, and recording data, and analysing and interpreting data are among these procedures, according to Stoffels (2005). Stoffels prioritizes both fundamental and integrated process abilities (2005). The investigative approach is matched with the Department of Education document (2008) description of practical examination for the development of problem-solving abilities. The department emphasizes both the procedural and content aspects of problem-solving skills development.

Practical activities include the investigative approach (practical examination) and the process approach, as seen in the following notions (doing of science). The process method is focused with the doing of science, whereas the practical examination is concerned with the thinking behind it. As a result, a practical exam does not distinguish between theory and practice in science. The investigative method addresses both the learner's desire to comprehend as well as the process skills they must develop to solve problems and think critically. It is important to note that, even though there is no single method to conceptualize practical examination based on the above perspectives, experts still have differing views on what practical examination is and what it comprises. As a result, a literature evaluation on the purpose and value of practical examinations is necessary.

2.3 THE PURPOSE AND VALUE OF PRACTICAL EXAMINATIONS

According to Millar (2004), a practical examination develops a learner's process skills. Millar (2004) further states that a practical examination gives learners a sense of their probity and allows them to appreciate uncertainty. Learners learn better when they create and carry out practical exercises on their own, as evidenced by research and depicted above, and a practical examination plays a critical role in teaching individual learners' experimental design. Practical examination enhances the competence to construct a hypothesis, plan experiments, collect observations, analyse data, handle errors, and convey findings, according to Shulman and Tamir (1973); Kolucki and Lemish (2011); Abrahams and Millar (2011).

Practical examination purpose refers to intentions of doing practical activities. There has long been a controversy over whether practical examinations are an important aspect of high school Life Sciences. The proponents of practical exam, however, suggest that there are many benefits of implementing practical examination. Practical activity allows learners to broaden their knowledge and deepen their comprehension of theories and scientific concepts (Kolucki & Lemish, 2011). (Abrahams & Millar, 2008). Practical examination gives learners an opportunity to experience basic and integrated Life Sciences processes (Pillay, 2004) it also improves learners achievements and acquisition of skills (Watts, 2003).

It needs to be noted however that there are some studies such as, Chang & Lederman (1994) and Jackman & Moellenbrg, (1987) that suggests that practical examinations are ineffective in the teaching and learning of Life Sciences (Watson, 1995). Abrahams and Millar (2008), Shulman and Tamir (1973), Kolucki and Lamish (2011) contradict those views by emphasizing that the use of practical examination improve learners' skills for designing experiments or formulating hypothesis etc. Lunetta et al (2007) labels the talents as scientific skills, whereas Hodson (1996) identify them as experimental skills.

According to the literature review, there are five different reasons for conducting a practical examination. In addition to the fact that practical teaching is more engaging for learners, literature suggests that it also (1) develops scientific content conceptual understanding, (2) develops practical skill, (3) fosters learner science motivation, (4) develops learners understanding of nature and scientific processes, and (5) improves learning skills. The performance of practical examinations promotes conceptual comprehension (White) (1996). Because the purpose of a practical examination is to reveal links between diverse Life sciences courses, the major goal of completing practical work should be to study with a thorough understanding of facts. Woolnough (1994) supports these themes, suggesting that learners' own knowledge of Life Sciences phenomena develops as they engage in true science.

Practical assessments, contrary to popular belief, allow learners to examine scientific knowledge in a different way than theoretical examinations (Zeidler, Walker, Ackett & Simmons, 2002). And learners are and always have been different from one another in many ways hence, a method that works for one group of learners may not work with the other (Banks, 2014). Same diversity may equally apply with educators' pedagogy, the way in which every individual educator teach effectively may not work with the other educator teaching in a different environment at different time. Therefore, a combination of practical activities with other types of instruction could thus be fruitful (Pillay, 2004).

Some academics believe that practical examinations encourage learners to learn science (White, 1996), (Woolnough, 1994), and (Woolnough, 1994). (Wezel et al., 2005). Enhance satisfaction, enjoyment and raising interest are confirmed as appropriate outcomes for practical examination. Positive attitudes and enthusiasm in science are fostered by learners' pleasure of practical examinations. According to White (1996), laboratories are not designed to be enjoyable, but learners love them when they are studying science. Fostering motivation is considered implicit objective for practical exam, whereas purposes of doing it are explicit ones.

Because of the more relevant setting, learners may be interested in conducting practical examinations, but simply doing so does not guarantee greater cognitive learning (Adey, 1997). Enjoying practical examination for learners does not make learners think or learn what they're up to. In science class, the practical class gives pupils the opportunity and freedom to attempt something new. As a result, improving scientific knowledge is an elusive goal of practical examination.

The nature of science describes how science works, what it is, how scientists collaborate as a group, and how society reacts to and regulates scientific endeavours (McComas, Clough & Almazroa, 1998). Learners should learn the way scientist develop scientific thinking (Shulman & Tamir, 1973). They should also be taught about a variety of scientific methodologies and their connections to technology. Science is more than just a set of equations; it's also a system of hypotheses, concepts, and observations, as well as theories that explain how they're related. The American Association of Physics Educators (AAPT) published a report in 1999.

The American Association of Physics Educators (1999) stresses that learners ought to comprehend that science is not just an assortment of conditions yet additionally a construction of ideas, speculations, and perceptions alongside hypotheses showing their interrelationship. As a result of the instruction that they get, learners ought to comprehend the substance of science as well as the idea of logical information. Grasping the cycles of science, according to Palmquist and Finley (1997), is an important aspect in grasping the notion of science Millar (2004), Padila (1999), and Pillay (2004) everyone agrees that scientific cycles contain tasks like observation, organising, documenting, deducing, deciphering, interpreting, and conjecturing. In the Life Sciences classroom, abilities such as making articulations from obtained data and supporting them can be equated to gaining a grasp of the cycles that researchers utilize to increase their understanding of everyday life (Hofstein and Lunetta, 2004).

Despite the value of practical activity in helping learners understand the nature and cycles of science, Windschit, Thompson, and Braaten (2008) contend that physical manipulation of equipment is frequently misrepresented in education, and that using practical work may distort science's epistemology and objectives. Specifically, the actual performing of practical work followed by implementation of practical examination is no simple assignment for Life Sciences educators, particularly on the off chance that they cannot participate in performing of actual practical work due to various reasons. In such examples they may misrepresent the practical examination implementation and manipulation of equipment by making use of demonstrations to introduce their learners to practical activities.

Driver (1983) takes a different approach, stating firmly that learners should conduct their own examinations during appropriate assessment, that is, create their own tests, gather, and analyse their data, and seek for their own solutions. Finally, Driver (1983) proposes that rather than following 'cookbook' recommendations with predetermined answers, such as choosing constants, learners should work on real-world situations that will help them enhance their logical abilities, thinking abilities, and awareness of how researchers' function. Practical examination, in this vein, gives sustenance for learning in a variety of ways, including experiential, group, and companion dialogue (Zimbardi, Bugarcic, Colthorpe, Good and Lluka, 2013).

Practical examination should also help learners develop their social and acquisition skills, according to the (AAPT) (1999). In summary, White (1996), Beatty and Woolnough (1982), and Hofstein and Lunetta (2004) suggest that emphasizing meaningful evaluation can assist learners in developing social skills such as engagement, teamwork, and the capacity to convey ideas. This urge for practical work is dubbed "social measurement" by Welzel et al., (2002), who suggest that practical work might potentially operate with cooperative social bonds and allow learners and educators to freely associate.

According to SCORE, understudies might learn health-related talents through practical experience (2009). Educators in South Africa must employ Practical Examination as a technique of training learners in their Life Sciences classes, according to Swain, Monk, and Johnson (2000). Swain et al., (2000) utilized this method to construct three more components as reasons for educators performing practical work: "(1) to encourage appropriate behaviour in theory; (2) to allow theory to work at their own speed while gaining a better conceptual grasp; (3) to substitute laboratory exercises for traditional teaching methodologies" (Swain et al., 2000).

2.4 PRACTICAL EXAMINATIONS AND ITS PLACE IN SCHOOL SCIENCE

It needs to be appreciated that most South African schools include both theory and practical exercises in teaching of Life Sciences. Even though different academics carry different perceptions with this regard, including Life Sciences educators. This could be because some people believe that practical education isn't true education, thus they teach their kids using just theoretical approaches (Furedi, 2010), while others believe that practical education should be prioritized because it allows learners to better understand subject content (Dewey, 1986). The view of the researcher is that practical work has lot deeper impact on learners, hence this study.

Most Life Science educators agree that practical examination needs to connect science concepts and theory discussed (Welzel et al, 2005). Even though there are various differing viewpoints on the efficiency of practical assessment in increasing learners' scientific understanding. Learners learn better when they design and carry out practical tasks on their own, as evidenced by research and depicted above, and a practical assessment is an important part of teaching individual learners' experimental design. Practical examination enhances the competence to construct a hypothesis, conduct experiments, collect observations, analyse data, handle errors, and convey findings, according to Shulman and Tamir (1973); Kolucki and Lemish (2011); Abrahams and Millar (2008).

Lack of clarity in the objective of practical work in science education may have an impact on specific learning outcomes, resulting in a variety of theoretical evaluation methodologies in schools (Millar, 2004). The motive for practical examination evaluation in Life Science classes remains a contentious topic. This research endeavours to broaden the discussion by running of the practical assessment as an important factor of the school Life Science educational program.

The practical examinations administered at schools only test theoretical principles. Even Life Sciences lessons does not encourage skills necessary to implement practical examination, this makes educators to administer practical examination for formality's sake without performing any practical activities. The implementation of practical examination does not have the actual impact thereof (Andrews, Leonard, Colgrove & Kalinowski, 2011). This is because practical examination implementation does not include any manipulation of apparatus but has at least three of the seven skills, and always include the interpretation of information but rarely allow learners to design an investigation (DBE, 2011).

Educators, on the other hand, must guarantee that the essential equipment is accessible for the proper execution of practical examinations, according to the Department of Basic Education. Little is done however to ensure that practical work is done during informal assessments (School Based Assessments). The Curriculum Assessment Policy Statement (CAPS) mandates that practical activities be completed in at least two of the three school terms, with formal assessments taking place in the final term. It also instructs educators on the content that should be taught to prepare learners for both formal and informal practical assessments. The Department further support educators by providing them with the Annual Teaching Plan (ATP) for every academic year, each ATP has detailed outline of which topic is to be taught when and how per subject and in every grade level. Department however does not provide any support on the invigilation and monitoring of the practical exam. This makes the National Curriculum Statements (NCS) policy expectations to differ from what is actual practices in Life sciences classrooms (Kibirige and Teffo, 2014).

The most noticeably terrible science educators take a stab at all to adorn the educational program by removing completely practical work from their teaching. Precisely, their main reason seems, to be to cover the annual teaching plan, this makes their lessons non-compliant to the Curriculum Assessment Policy, yet all their learners receive marks for practical examination (Brian, 2008). Traditional teaching methods are still used in the presentation of Life Science lessons in those classes (Bhaw & Kriek, 2020). The teaching process in traditional teaching is dominated by method educator-centred methods. In the traditional teaching method, the educator spends most of the class time lecturing, while the learners watch and listen. The learner's work is stifled (2014, Ramirez).

Practical examination, on the other hand, involves a learner-cantered approach to instructional techniques, shifting the focus of action away from the educator and onto the learner. As part of active learning, learners solve issues, answer questions, frame their own questions, discuss, explain, argue, or brainstorm during class. It also encourages cooperative learning (Gillies & Ashman, 2003), in which learners collaborate on themes and projects in both positive and negative dependence scenarios. Individual accountability is emphasized, as is inductive teaching and learning, which involves giving learners a task and then teaching them course information while they solve the problem. The educator's and learners' responsibilities in learner-cantered techniques should be congruent with constructivist learning theory (Ramrez, 2014).

Through learner centred approach, Millar (2004) suggests that learners would understand concepts and clearly learn content. Learner centred approach shift focus of teaching from educator to learner. This shift offers learners the best experience to engage with the educator as well as other learners as they gain content understanding. It further helps in developing deep science material understanding through its constant engagement. Woolnough (1994) suggests that practical assessment should be used to increase learners' scientific phenomenal knowledge.

Educators should connect science principles and theory in practical examinations (Wenzel, Donnelly, Fowler, Habbal, Taylor, Aziz, & Cella 2005). Even though, some opinions suggest that practical activity is not effective. Hodson (1996) for example, does not consider practical activities as one of the best techniques to deliver scientific facts. However, according to Pillay (2004), learners can examine scientific information through practical examination, so it is feasible that combining practical examination with other methods of training can yield positive results.

Despite the potential benefits of practical assessments, Windschit, Thompson, and Braaten (2008) argue that practical examinations are oversimplified in teaching, and that teaching undermines science's philosophy and purpose. It is difficult for educators who do not participate in skill development to teach through practical exercises. As a result, they'll simplify its presentation to their learners. According to Driver (1989), learners must perform their own investigations, develop their own experiments, record, and analyse their own data to achieve their own solutions during practical tests. In other words, rather than following "cookbook" instructions that deal with previously known solutions, Driver (1989) suggests that learners engage with contextual issues that would help them improve their scientific and thinking abilities and knowledge.

The importance of practical practice in classroom science is widely recognized, according to SCORE (2007). It is, nevertheless, critical to ensure that such acceptable assessment supports teaching and learning. Adaptability is given to the Life Sciences educator to do this comparable to their learners' requirements. Specifically, SCORE (2007) feels that the acquaintance of how science works with levels in the sciences should be firmly observed.

According to White (1996), Beatty and Woolnough (1982), and Hofstein and Lunetta (1982), practical examination participation should help learners in developing social skills such as collaboration and the capacity to connect. Wenzel et al., (2005) reaffirm this by stating that "social dimensions" allow learners and educators to communicate. SCORE (2009) emphasizes the importance of safety and claims that practical examination allows learners to develop abilities for laboratory safety precautions. In the United Kingdom, educators have used practical examination to teach mixed achieving classes (Swain, Monk & Johnson 2000). Three reasons for educators to conduct practical examinations, according to Swain et al., (2000), are to reward excellent behaviour, allow learners to work at their own speed, and add diversity to classroom activities.

In Life Science education, a lack of defined aim and ideas about practical assessments effects learning results and leads to a variety of methods to practical activities in schools (Millar, 2004). In Life Science classes, the aim of practical activities is still mostly unknown. This study adds to the argument by concentrating on practical activities as a component of the school science curriculum's examination.

There are a variety of perceptions about the importance of practical examination in Life Sciences with some educators relying on practical activities to play a vital role in science teaching (Ebenezer & Zoller 1993; Chang & Lederman 1994). Other educators feel that focusing on practical examination will narrow science conception (Hodson 1996). Tamir (1989), and Chang and Lederman (1994) advise that educators are important for effective learning of practical examination. Therefore, Tamir (1989) suggests that the efficiency of understanding in the laboratory can be attained through considerable improvement in educators' perceptions.

Classroom practices and learning outcomes are influenced by an educator's perceptions of teaching and learning of the curricula (Calderhead 1996). Therefore, a change in educators' practice is preceded by a change of educators' perceptions of teaching (Brown, Collins & Duguid 1989). Educators' perceptions about curricula change are very important, as educators are the ones who are expected to apply that change. What educators think determines the success of any educational change (Fullan & Hargreaves 1991). If educators have negative feelings about a curriculum reform, the changes are unlikely to be implemented as planned. Ignoring educators' perspectives will sabotage the fundamental goal of implementing the reform (Van Driel, Beijaard, & Verloop 2001). On the other hand, for educators to respond effectively to the curricula reform, they must have a clear grasp of the proposed adjustments (Webb, Cross, Linneman & Malone 2005). The researcher investigates the perceptions of Grade 10 and 11 Life Sciences educators on the introduction of an obligatory practical examination in this study.

Educators, according to Kibirige and Teffo (2014), have a negative perception of practical activities and only participate in them to meet the minimum curriculum requirements. The causes for this bad attitude, according to Ownu and Stoffels (2005), are a lack of experience, insufficient training, and huge and under-resourced classrooms. Educators in some South African schools appear to be hesitant to teach science (Kibirige & Hlodi 2013). The educational system does not prepare educators to conduct experiments, which adds to educators' negative impressions of practical examination. According to academics, professors in tertiary education institutions lack the knowledge and experience necessary to conduct practical examinations. As a result, when teaching Life Sciences or science courses, educators use chalk, conversation, and demonstrations. When preparing future scientific educators, tertiary institutions should also emphasize practical skills.

According to Haigh (2003), educators do not engage in practical activities for three reasons. Firstly, they lack equipment at schools, secondly, they do not have enough teaching time, and thirdly, congested classes. Another factor for educators' dissatisfaction or lack of involvement is teaching outside of their subject; an educator trained in geography, for example, may be compelled to teach in the sciences due to an educator shortage (Ramnarain 2011; Mokotedi 2013). Educators of this type are notorious for refusing to participate in hands-on activities (SORE 2009; Abrahams & Millar 2008).

It was also discovered that educators lacked the necessary laboratory equipment as well as support from laboratory professionals (Onwu & Stoffels 2005; Pillay 2004). Educators who double as technicians miss out on imparting pertinent material or providing suitable feedback to learners during practical examinations. Furthermore, according to Muwanga-Zake (2008), many educators maintain science equipment to decorate their offices rather than use it in science lessons. Many educators, according to the survey, are unaware of the importance of a practical assessment in the curriculum. The same study highlights the importance of labs in schools and educators who lack the requisite practical skills and trust to engage in practical assessments.

As a result, most educators who conduct experiments use textbooks and perform experiments in the style of a "cookbook" recipe. Such techniques, as Driver (1983) points out, do not teach scientific process understanding, nor do they teach learners conceptual knowledge (Muwanga–Zake 2008). This research will add to the body of knowledge by shedding light on educators' opinions on the practical exam's implementation in the context of South Africa.

Perceptions are "more broad mental designs, perception, appraisals incorporating convictions, implications, ideas, suggestions, rules, mental pictures, inclinations and such" (Brown, 2004). They consequently address various classifications of thoughts that educators have of how they experience instructive wonders and give structures to getting, deciphering, and connecting with the educating/learning climate. Educators' perceptions on educating/learning and educational plans impact practical examination implementation and Life Sciences learning results (Calderhead, 1996). Also, changes in educators' perceptions on educating/learning and educational plans go before changes in their training (Brown, 2004).

Educators' perspectives influence how they teach, as well as the tools, content, and learner activities they utilize. Because they are the ones who must execute the changes, educators' opinions on curricular reform are crucial. The effectiveness of every curricular reform, according to Fullan and Hargreaves (1991), is based on educators' opinions. If educators have a negative attitude toward these changes, it is almost certain that the instructional strategy will not develop as planned.

In fact, disregarding educators' perceptions during curriculum change will ruin the main role of presenting changes (Van Driel et al., 2001). Educators will require a strong consensus and clear perspectives on the proposed modifications if they are to respond honestly to the obstacles of another educational program (Webb et al., 2005). Educators' judgments can serve as routes through which new knowledge and interactions are evaluated for relevance, according to Zipf and Harrison (2003). The researcher is interested in the opinions of Grade 10 Life Sciences educators on how the essential practical assessment is carried out in this study.

In this research the researcher looks, audit and write about the South African education setting, since this research is based in South African Life Sciences education. This research will be contextualized by existing research on educators' attitudes on practical examination, which will be used later in the publication of the study findings. As a result, the term "educators" in this poll refers to South African educators.

Educators' views about practical assessments are unfavourable, according to Kibirige and Teffo (2014), and they only participate in practical examination to satisfy the criteria of the fundamental educational plan. Using practical assessment research with 53 practicing educators in Venda, Limpopo, Ownu and Stoffels (2005) revealed that most educators had "little experience, minimal preparation, and worked in large and inadequately resourced science classes."

Educators' negative impressions and mentalities regarding practical examination evaluation might be exacerbated by several factors. Educators in certain South African schools are wary about including practical work into the curriculum (Kibirige and Tsamago, 2013). Bestowing to Bradley and Smith (1994), educators' negative attitudes about practical examinations are exacerbated by an educational system that does not educate them to administer examinations or make acceptable assessments. As a result, when teaching Life Sciences, educators use chalk-and-talk, addressing, and exhibitions.

According to Haigh (2003), educators' lack of interest in practical examination evaluation may be linked to three factors: first, access to laboratories is a major concern, second, there is insufficient teaching time, and third, classes are overcrowded.

According to Ramnarain (2011), Hatting and Rogan (2007), and Mokotedi (2013), another significant justification for educators' helpless perspectives and disposition toward practical examination assessment, as well as their non-commitment, is that a few educators are teaching out of field, and there are fewer educators teaching Life Sciences who were trained to teach it.

2.5 CAPS REQUIREMENTS AND PRACTICAL EXAMINATION

Aims of practical examination includes an active engagement of learners and supporting them as they develop important skills. CAPS stipulate that learners' should acquire the following skills while undertaking practical investigations:

- They need to be able to follow directions,
- to operate machinery or equipment,
- to observe,
- measurements,
- to keep track of information or data,
- to interpret data and
- • to plan an experiment or study.

These abilities combine basic and applied science knowledge. These skills should be developed in Life Sciences classrooms using a "hands-on," "minds-on," and "hearts-on" approach. According to Kapenda, Kandjeo-Marenga, Kasandra, and Lubben, there are five types of practical examination performance (2002). Practical assessment is used to assist learners in developing specialized talents, testing hypotheses, and solving issues, as well as to introduce learners to a phenomenon, for educators to construct scientific arguments or generate dramatic impressions, and for fieldwork.

Different types of practical activities achieve different purposes. Therefore, for educators to develop CAPS-specified skills, they must make a judicious selection of the type of practical examination they present. Educators need to have tacit knowledge, which cannot be verbalised (LaFemina, 2002), as to how to conduct experiments themselves.

Unspoken information cannot be taught using a chalk-and-talk technique; instead, learners must be given the opportunity to do implicit work. Learners must take all the practical examinations since each one focuses on the development of a particular skill rather than all of them at once. Educators must fit the type of practical assessment to the anticipated goal and objective for Life Sciences learners as stipulated by CAPS. A practical examination designed to improve one area of cognition cannot be used to improve other areas of cognition.

2.6 CHALLENGES ENCOUNTERED BY EDUCATORS

Educators in South Africa were exposed to a "one-time" style of Educator Professional Development (TPD) conducted by topic advisers during curriculum reform (Bantwini 2009; Singh–Pillay & Alant 2015). According to the government, educators were meant to improve their teaching approaches after getting such professional development. This "one-time, just-in-time" approach overlooked educators' various experiences, life histories, and professional and personal lives, treating them all the same. These TPDs confined educators to a culture that did not accommodate a wide variety of their needs, as well as their learners' expectations.

The current cascade for TPD negates the variation of the teaching and learning process, and it does not create a platform for educators' PCK. Educators still need major professional development redirection to enact CAPS' policy ideas of a Life Sciences practical exam. It is therefore essential to empower educators' capacity development (Lasky 2005). Professional development for educators is not set in stone; it may be sculpted.

The new curriculum, according to Jansen and Christie (1999); Chisholm (2005); and Singh-Pillay (2010), increased demands on teachers' workloads. To implement a new curriculum, educators must both de- and re-skill (Singh–Pillay 2010). The quality of practical examination implementation is seriously impacted by the widespread poverty in many South African nations, and rural schools confront significant obstacles in this respect. Most of the teachers in those schools are underqualified, and there are not enough resources or funds to support multi-grade teaching. The quality of education in rural schooling has not improved or has very slightly improved after 28 years of democracy. Most rural schools lack power, water, and sanitary facilities, which has an adverse effect on how practical examinations are administered. The quality of how practical examinations are implemented is also badly impacted by various categories of rural schools. Rural places are typically distant and impoverished. Because of this, many schools lack the necessary physical resources and sanitary facilities (Mulford & Johns, 2004). Due to budgetary limitations, even provincial governments are unable to provide the essential infrastructure to remote schools, which also contributes to the unsatisfactory implementation of practical examination.

Since educational authorities are unable to provide the necessary physical resources and human resources for remote schools, parents are left with the enormous responsibility of buying school supplies for their children. Parents in rural South Africa typically have menial jobs, have lower levels of education, and don't place a lot of value on education, making it difficult for them to acquire any supplies that life sciences instructors would require (Du Plessis & Mestry, 2019). Even though the South African Schools Act of 1996 and the Constitution of the Republic of South Africa of 1996 stipulate that every learner in South Africa should have access to teaching and learning with comparable facilities and equal educational opportunities, this has a negative impact on the implementation of practical examinations.

Practical examination is integral for Life Sciences and other science subjects (Toplis & Allen, 2012). Practical examination in the whole of secondary science education date as back as 1950s (Gee & Clackson, 1992). This remark is backed up by Gott and Duggan (1996), who saw practical examination in small groups in the 1950s and 1960s as a way for learners to study things for themselves. The main reason why practical examination was introduced was to teach learners how to learn. Practical examination provides therefore for testing, developing, and comparing experiences in Life sciences (Lawson, 2010). Practical examination allows for learner centred teaching in CAPS curriculum as it offer learner’s opportunity to carry something is missing here research rather than to depend on educators for provision of information (Lubben, Campbell, Kasanda, Kapenda, Gaoseb & Kandjeo-Marenga, 2003). It also allows learners to develop capacity to transform and apply their knowledge to skills and abilities either in class or their everyday life.

Practical examination reaches its high peak if learners perform it themselves rather than demonstration by educators. Performing practical examination allows learners to discover their learning. It is an active learning, it organizes what is to be learned (Tafa, 2012); it also involves analysing, synthesizing, and evaluating results (Cheer, Elliott, Kim & Choi, 2013). Science education bases on observing, investigating, and experimenting to understand the subject better (Miller, 2004). As a result, practical assessment allows learners to gain hands-on knowledge that will aid them in making educated decisions (Miller, 2004). It also piques learners' interest in the subject and makes them want to study more (Braud & Driver, 2002).

Practical examination on the other hand helps in assessing concepts and to diagnose how much each learner understands science concepts (Gott & Mashiter, 1991). According to CAPS practical examination is aimed at gathering knowledge (Department of Education Policy document, 2011) while practical examination can be used to assess gathered knowledge. Despite the CAPS goals, educators do not convey the purpose of activities to their learners (Kampunzu, Tembo, Matheis, Kapenda & Huntsman-Mapila, 2000). Practical examinations in secondary schools are poorly designed, and learners have little comprehension of laboratory work (Hodson, 1992). Knowing the purpose and significance of practical examination makes learners learn well (Maboyi & Dekkers, 2003).

This means every practical activity must be such that it has a specific purpose. It should have motivational aspects that links to promoting interest and observation skills. Van den Berg and Giddings (1992) differentiate between two categories of practical examination aims, *i.e.*, affective, cognitive, and practical aims. Motivating learners and influencing their attitudes toward practical examinations are two examples of affective goals. Cognitive goals are concerned with improving idea understanding and abilities (Kutas, Iragui, Niu, D'Avanzo, Yang, Salmon & Olichney, 2013). Practical aims relate to developing skills for performing experiments, relations, and cooperation among learners.

Assessment about science, assessing science, and assessing science practicing are three parts of practical examination in secondary school education, according to Hodson (1996). These characteristics include observation, recoding, critical thinking, manipulating skill development, and elucidating theory as goals of practical examination implementation. According to studies, practical examinations increase the workload of both learners and educators (Johnstone, 1991). When educators expect learners to achieve all their learning objectives, practical examination is sometimes overdone. It's also underutilized when its true potential isn't realized (Ergin, Choudhari, Fischer & Tumin, 2005). It is Life Sciences educators dilemma to strike a balance between overuse and underuse. Educators' perceptions regarding implementation of Life Sciences practical examination are important. (Maharaj, 2014), because they determine educator's method of teaching in their classrooms. Individuals chose, arrange, and understand stimuli to create eloquent and clear representations of life around them through perceptions (Klazky, 1984).

As a result, educator impressions are crucial in the teaching and learning process. This study accepts Klazky's idea of perception since there are processes that occur when educators choose the meaning of inputs in their classroom context (Klazky 1984). That is why this study focused on educators' perceptions in the implementation of Life Sciences practical examination. Even though educators are aware of the importance of practical examination, they still do not implement the practical examination but give learners marks for promotion to the next grade. They suggest several reasons why practical examination should not be implemented: Some Life sciences educators in grades 10 and 11 are concerned about a lack of skills or faith in their learners' ability to handle laboratory equipment, while others allege a lack of time to perform practical assessments. All these criticisms do not negate the significance of practical examinations, as mentioned in CAPS.

The importance of Life Sciences practical examination has been studied before, and educators agree that it is critical (Dikmenli, 2009). Due to their beliefs of the goal of practical examination in general, educators pay little attention to the development of scientific process skills (Reid & Shah, 2007). Passive dependence is shown by certain instructors, compounding the problems (Samuel 2014). As a result, such teachers do nothing to increase their subject knowledge (Kriek & Basson 2008; Taylor 2008) or their understanding of how to utilize and set up the equipment required for practical exams (Rollnick 1997). Educators' challenges with curriculum change have an influence on how they apply curricular principles. As a result, educators should have access to professional development that allows them to reconfigure their identities, manage their own professional development, and modify their teaching techniques.

Studies on educators' perspectives of practical examination and inquiry have been undertaken, according to the literature. There was a paucity of data on how educators employed Life Sciences practical activities to produce a practical test. The information needed to answer all three research questions was acquired using a questionnaire, which looked at educators' practices and ability to innovate on practical activities, as well as their experience with practical assessments.

2.7 CONCLUSION

This chapter included a literature review that focused on researchers' concepts of practical examination, the goal of a practical examination, and educator issues with practical examination implementation. This literature underlined the critical role that educators have in deciding how to implement practical examination (Van Driel, Beijaard, & Verloop 2001) to achieve the policy document's skill development requirements. The next chapter provides a detailed description of the study's research techniques and design.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The research technique for the study is covered in this chapter. The actions required to complete all aspects of the study, including data production to address the stated research questions, are referred to as research techniques (Cohen, Manion and Morrison 2011). The planning and procedures involved in conducting research are all included in the study design (Creswell 2013).

3.2 RESEARCH DESIGN

This study took a qualitative method since the researcher was motivated to collect data in the form of words rather than statistics (McMillan & Schumacher 2010). This allowed the researcher to capture developments in their natural settings (Denzin & Lincoln 2011) and to understand people's perceptions (Creswell & Poth, 2017). The researcher had no intention of controlling variables even though he played an integral part in the data collection (Veal 2005).

To understand how life sciences educators experienced adoption of practical exams, the researcher used a qualitative approach. Moreover, a qualitative approach gave educators the freedom to fully consider the questions and convey their own opinions and perspectives on the purpose and application of Life Sciences practical assessments (McMillan & Schumache 2010). This method did not confine educators to multiple-choice questions that would not allow for other options (Merriam 2002).

The interpretivist paradigm is used to frame this research. According to Cohen et al., (2011), the goal of this paradigm is to grasp, describe, and analyse in depth the daily behaviours of study participants. The researcher was able to get insight into the perspectives of Grade 10 and 11 Life Sciences instructors on the implementation of Life Sciences practical examinations by employing this paradigm.

The use of a case study design in this study was motivated by the ontological position of an interpretative paradigm to preserve the significant and comprehensive aspects of real-life occurrences of practical assessment implementation (Yin 2014). There are five forms of case studies according to Yin (1989); case studies can be single case studies, multiple case studies, exploratory, descriptive, or explanatory. A multiple case study was employed since the research was done in forty-five different high schools with forty-five Grade 10 and 11 Life Sciences educators. A multiple case study has distinct advantages over a single case study because they consider the variety of circumstances. In a case study, data is structured and presented depending on how a person or group of people behaves in certain settings or conditions, according to Romberg (1992). According to Yin, a case study is a method that allows the researcher to (rarely) change the subjects of the inquiry (1994). According to Simons (2009), a case study is a comprehensive investigation into a policy, initiative, or system from several angles because of its complicated nature and uniqueness in a real-life setting. Cumbersome

3.3 STUDY SAMPLE

45 teachers of Grades 10 and 11 from 45 different schools in the Lebowakgomo area made up the study's population (Mankweng circuit, Dimamo circuit, Kgakotlou circuit, Lebopo circuit, Lebowakgomo circuit, Mamabolo circuit, Pietersburg circuit, Mphahlele circuit and Seshego circuit). Quintile 1 to 4 rankings are mixed across the schools in these circuits (Sayed & Motala, 2012). The old Model C school is in Quintile 1; it has resources and is based in a township. Quintile 2 schools are in townships and have some resources, but not all of them. Quintile 3 schools are those that are in semi-rural locations. These schools were formerly underprivileged and have few resources, but they are still close to urban centres. Schools classified as Quintile 4 are those that are in remote places, have few resources, and occasionally can't be reached due to severe weather at times (White & Van Dyk, 2019). In each circuit five schools, and teachers for grades 10 and 11 were chosen since life sciences are taught in those schools. Additionally, they were chosen because they either teach Life Sciences in grades 10 or 11.

3.3.1 Population and sampling strategy

The researcher used convenience sampling to choose 45 teachers (9 circuits and 5 schools each circuit) and administered Grade 10 and 11 Life Sciences practical exams to understand educator's perspectives and experiences. Purposeful sampling, according to Leedy and Ormod (2005), is the practice of choosing individuals or groups for a particular objective. According to Cohen et al. (2011), purposeful sampling is used to connect the researcher with individuals who already have or are likely to have relevant information. Because they conduct practical exams with or without enough resources, their schools were chosen.

3.4 DATA COLLECTION

Qualitative data was acquired to fulfil the study's aims and objectives. Open-ended questions were used to build a questionnaire (appendix A). An open-ended questionnaire was used to gather data for this study because open-ended questions might represent the uniqueness of a particular scenario (Cohen et al., 2011), such as the opinions of Grade 10 and 11 Life Sciences educators on the implementation of practical examinations. Additionally, since respondents are not constrained in what they may say, open-ended questions, according to Cohen et al. (2011), make it easier for responders. The researcher visited participants at their schools, with the supervisor's approval, to make contact and build the connections necessary for the study. The questionnaire was given to each participating Grade 10 and Grade 11 Life Sciences teachers at the chosen schools. Teachers had a month to complete the questionnaire before it was collected. After two weeks, phone calls were made to the respondents to remind them to submit their responses on time (Kerr 1963).

3.5 RESEARCH INSTRUMENT

An open-ended questionnaire was used to respond to the study's given questions since it was deemed acceptable to capture their specificity (Cohen et al., 2011). A questionnaire with open-ended questions was chosen since it was appropriate for gathering the necessary qualitative data.

The questionnaire was developed with the assistance of academics from the University of Limpopo, and it was piloted through teachers of Life Sciences in grades 10 and 11 in the distant Mpumalanga province. Since pilot studies are used to test research instruments, the goal of the questionnaire pilot was to check for clarity-seeking items and remove problematic wording from the questionnaire (Majid, Othman, Mohamad, Lim & Yusof; 2017). The pilot's goals were to increase the questionnaire's reliability and validity and to investigate whether the questions were appropriate. It enabled the researcher to test out different questionnaire methods and make necessary modifications (Cohen et al., 2011).

3.6 DATA ANALYSIS

After being received, each response was reviewed twice to ensure correctness and completeness. Using qualitative content analysis, the data was examined. Schreier (2012) asserts that content analysis is a systematic and unbiased method for characterizing and measuring physical processes. According to Hsieh and Shannon (2005), content analysis is a research strategy for objectively assessing text data using a systematic coding and topic identification process. Researchers assert that the objective of qualitative content analysis is to classify unstructured material into conceptually comparable groups. According to specialists like Mouton (2001), Creswell & Creswell (2017), and Cohen et al. (2011), data analysis involves:

- Preparing and consolidating data,
- Data is organized into themes, and
- Using tables, figures, or dialogues to present data.

The data analysis for this study encompasses the previous three processes to offer answers to the posed research questions. Latent and manifest analyses are the two varieties. Using manifest content analysis, this study was analysed. Real educators' words were used by the researcher to describe what they stated or what was evident in the text using manifest content analysis (Bengtsson 2016).

3.7 QUALITY CRITERIA

The following is a full overview of the study's trustworthiness. Guba and Lincoln (1994) established four components that correctly capture qualitative research assumptions, and these constructs are discussed and applied to this study.

3.7.1. Transferability

The results of this study will be limited to Grade 10 and 11 Life Sciences educators in the Lebowakgomo area, making it difficult to extrapolate to other demographics. However, to overcome this, schools will be described, and participants will be provided so that a comparison can be made. In addition, to allow the study to be repeated the researcher will describe the research design and methodology.

3.7.2. Credibility

Participants will create rapport so that they feel free to participate. Material will be shown to them to determine whether they agree or do not agree with the report presentation (Member checks).

3.7.3. Conformability

This will be covered in this study by an audit of the research process by the supervisor. Peers who are knowledgeable in qualitative research will check the findings of this study.

3.7.4. Dependability

The supervisor will conduct external audits of the research process and outcomes to ensure that the research study is accurate, and that the data is adequate.

3.8 CONCLUSION

This chapter examined the philosophical foundations of the research as well as the grounds for employing a qualitative strategy and a case study technique within the interpretivism paradigm. Also described study's setting, methodology, and data gathering strategy. The reliability and validity of the study, as well as the methods used to analyse data, were all discussed (Nieuwenhuis 2012). In the next chapter, the researcher describes the results of the data analysis and the conclusions of the study.

CHAPTER 4

RESULTS

4.1 INTRODUCTION

Previous chapters discussed the study methodology, sample procedure, research design, data collection, and data management. This chapter provides the methods for data analysis and the results.

The major research topic, as well as the two sub questions, are addressed in this chapter.

> "What are the perceptions of Grade 10 and 11 Life Sciences educators towards the implementation of practical examination?"

And the two sub-questions,

(1) How do Grade 10 and 11 Life Sciences educators conduct practical examinations?

(2) What limitations have Grade 10 and 11 Life Sciences educators identified to be allocated with practical examinations?

Data were gathered using the questionnaire, as was already mentioned. This chapter is divided into four sections. Section A contains the biographical responses to the questionnaire. The two sub-questions as well as the primary research question are to be addressed in Sections B through D. A summary of the chapter is provided at its completion.

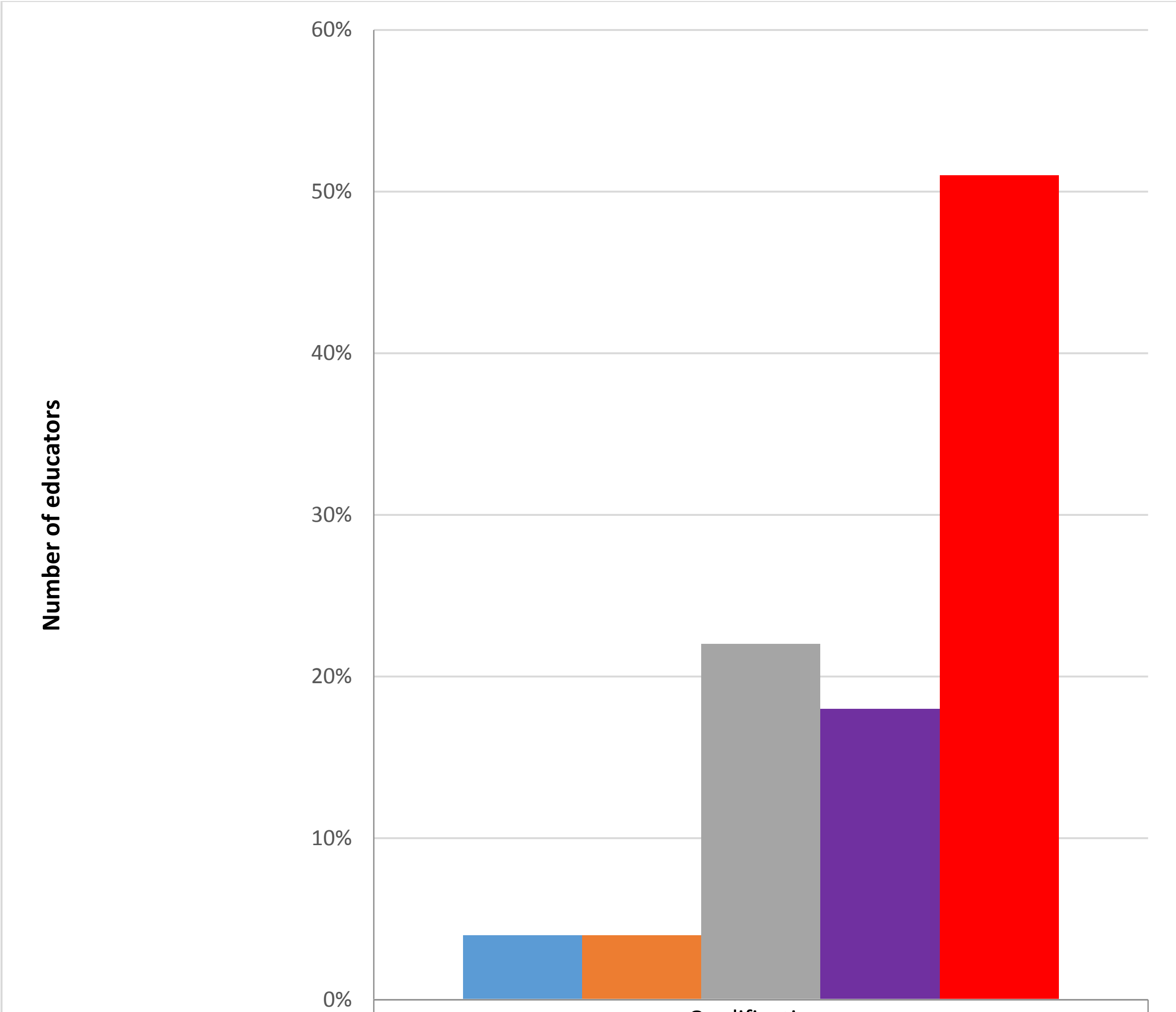
4.2 BIBLIOGRAPHICAL RESPONSES

The survey's first portion asked questions about the educator's age, gender, experience teaching Life Sciences, qualifications, workload, and training they had received for carrying out practical lessons and evaluations.

The study's findings show that gender has no impact on how life sciences are taught and learned. Only 42% of life sciences educators were men, whereas 58% of them were women. This shows that women are also a significant portion of the teaching workforce in the life sciences. With 16% more women than males, there was virtually equal gender representation among research participants. These results support Breda and Hillion's (2016) assertion that there is no gender disparity in the fields of science, technology, and mathematics.

The qualifications of all participants are shown in Figure 2 below; all educators of Life Sciences in grades 10 and 11 who took part in the study were qualified in the life sciences to some degree. However, 51% of the teachers have a diploma. This raises concerns about the educator's pedagogical and subject-matter expertise because there seems to be a great deal of confusion among Life Sciences educators about how to arrange and carry out practical assessments (Madani, 2020). For the successful administration of a practical examination, CAPS requires new teaching methods, which are thought to be like teaching practices and PCK (Samaneka 2013), (Chan & Hume, 2019).

A practical exam is very significant since it enables learners studying Life Sciences to progress up a grade. Therefore, whether learners have acquired the skills required for practical exams and Life Sciences as a topic is a key criterion for learners, educators, and even society (Pillay 2020). Because of this, practical assessments are a crucial component of secondary school Life Science teaching and learning, and teachers need to be experts in their fields to provide a good education.



	Qualifications
Master of Education	4%
Honours in education	4%
Bachelor of education	22%
Post graduate certicicate in education	18%
Diploma in education	51%

Figure 2: Participant's qualifications

The teaching load for educators in life sciences and other subjects is depicted in Figure 3 below. Only 18% of teachers exclusively have Life Sciences in their workload. At least 82% of educators must balance the demands of the Life Sciences curriculum with those of the other learning areas' continuous assessment (CASS) requirements while also teaching other courses. The quantity of work educators must do negatively affects how much they use reflective teaching strategies, which are vital for both successful instruction and professional growth (Bawaneh, Moumene & Aldalalah, 2020).

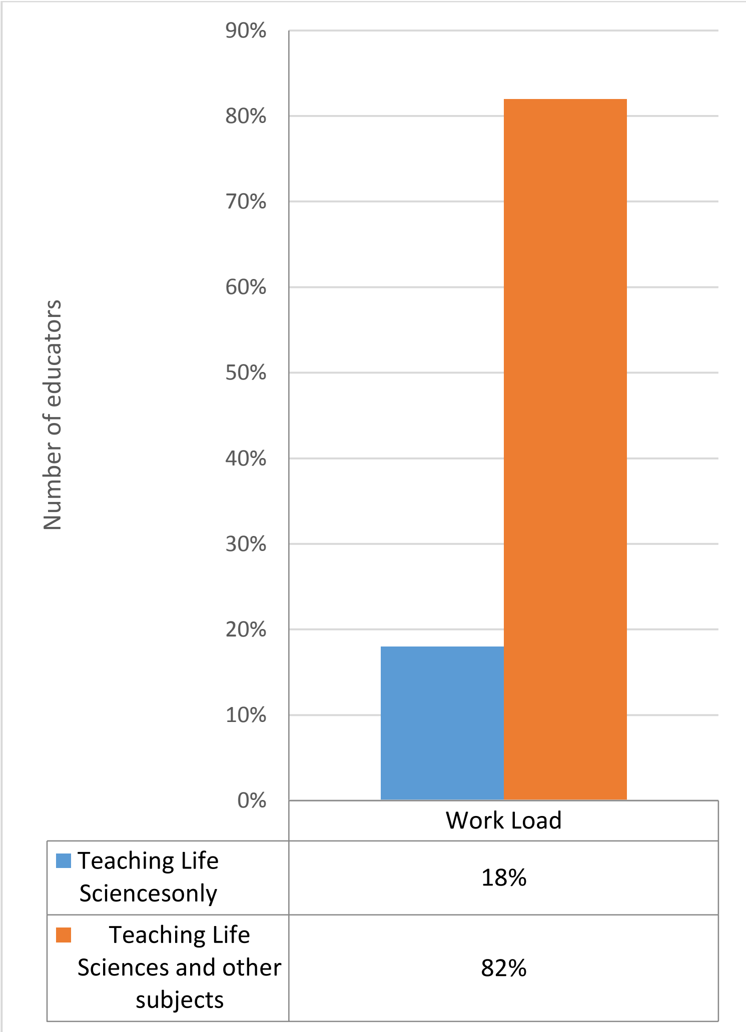


Figure 3: Participants teaching load, Life Sciences, and other subjects.

4.3 THE VIEWS OF EDUCATORS ON THE IMPLEMENTATION OF A PRACTICAL EXAMINATION

"What are the perceptions of Grade 10 and 11 Life Sciences educators towards the implementation of practical examinations?" was the key research topic, it focuses on the perceptions of Life Sciences educators in Grades 10 and 11 on the implementation of a practical assessment.

Given that adding a practical assessment aid all learners studying the Life Sciences, it's important to comprehend why there are variations in how it's carried out. Finding strategies to eliminate disparities and improve the execution of the practical assessment can be aided by understanding the perspectives of educators on it. To get various perspectives on a practical assessment, an open-ended questionnaire was used. Using content analysis coding, the perceptions of grade 10 and 11 life sciences educators on how a practical examination was conducted are separated into two main categories: unfavourable and favourable perceptions. (Kim, Wang, Kang, Choi, & Coba-Rodriguez, 2020; Cambray-Engstrom et al).

Four percent of Life Sciences teachers in Grades 10 and 11 have favourable perceptions toward the establishment of practical exams, although they are still against it. Modernized learning in the life sciences classroom considers both the presence and the utility of external factors. For instance, demonstrating cellular respiration to learners in grade 11 Life sciences is necessary to remove misconceptions among them that only animals have cellular respiration and plants are capable of photosynthesis only. Learning will be challenging for the pupils if we use chalk and speech to clarify these contrasts.

Data also shows that practical examinations help learners gain a general understanding of why things occur the way they do. Effective teaching of the Life Sciences begins with practical examination, which fosters creativity, originality, and imagination. Teachers are astonished to learn that despite their best efforts, learners cannot fully understand the theoretical material they teach in their Life Sciences classes until they conduct practical examinations (Alias & Ibrahim, 2016). Even those who can provide the finest answers do so only because they were able to recall words; otherwise, they would have little to no knowledge of scientific principles (Smith & Kleinman,1989).

From quoted text below, educator's useful opinions in teaching and learning were displayed through the energy of the learners when partaking in practical examination. The passion of educator’s typically moves to the learners, which similarly animates the disposition of both included.

> *Learners are truly eager from the beginning of practical examinations activities; from the moment I bring equipment to class they even tell their friends to keep quite if they disturb their focus. During practical classes learners never stop asking questions some of which are a bit difficult to answer. After performing such practical learners come the following day*

*and say "educator we saw" or "we also searched" which invigorates them more (*T11, appendix I)*.*

Another teacher made it clear in her lessons that the learners enjoyed hands-on activities, and she went into detail about how their teaching strategies had evolved to enhance the quality of the learning experiences. Practical examinations should be used as one of the evaluation techniques instead of providing short-term information that is just useful for evaluating objects, since this will benefit talented learners (Sims, 2006). This teacher made it obvious that during practical examinations, learners started to relate the subject matter to reality and stored their understanding in their long-term memory.

When learners moved to a field camp and returned with information and images for a previously taught practical examination, recently completed encounters were changed into entirely produced experiences (see appendix I, T23). Even the most reserved kid in the classroom was interested and engaged with others via questions and answers, some questions were even challenging for the teacher at times but also fascinating as opposed to simply having the same learners asking questions while others just quet and watch. While the researcher was compiling questionnaires, this energy was also demonstrated to him:

*We were walking outside our school and there was a great deal of plants, and they (learners) quickly yelled "Educator, take a look at the vegetation, take a look at the vegetation!" Do you understand, they would not have seen that vegetation should we not have decided to leave classroom and observe the environment in a specific manner… they would have walked over it and would not have understood what it is (*T23, Appendix I)*.*

The trip was purposefully planned, so everything was obvious, and learners were able to understand the material that had already been covered in their Life Sciences classes, according to Appendix I (T23). The teacher confirmed that learners enjoyed the time allowed to conduct independent research and that this option was present. Finally, the teacher made it clear that the advantages of experience learning in the setting of the classroom encouraged receptivity to varied circumstances and systems. The decision to schedule a short walk around the school with their Grade 10 Life

Sciences learners was made because of their willingness to be more open (Pherson-Geyser, 2020).

A staggering 96 percent of Life Sciences educators in grades 10 and 11 felt negatively about the entire process of administering a practical assessment and the subsequent practical test. The 4 percent positive perceptions displayed is also only associated with one factor—positive answers from learners during practical exams—and not with how those exams affect learners' performance. According to educators, improvising throughout the course of the year is easier than it is during practical exams. This good aspect can be linked to a bad aspect of how a practical exam is conducted, which leads to the conclusion that Grades 10 and 11 Life Sciences teachers have a negative attitude about the implementation of a practical exam. The expressed negative opinions are listed in Table 1.

About 96% of educators indicated that they lack resources. This makes educators think they are burdening the society since they must send learners to their parents for assistance. They do, however, acknowledge the fact that learners embrace learning through doing and they are magnificent to do it every day, lack of resources makes it demand only on their side to perform practical work. The trifecta of an educator, learner and parent is truly tested during these implementations. Educators articulated that they lack resources to perform even the most basic experiments in Life Sciences, yet they are expected to be scapegoats for such problems.

Coronavirus disease -2019 (COVID -19) has exacerbated the situation (Chadwick & McLoughlin, 2020). It forced drastic changes in every layer of life. As it is required that social distancing and sometimes lockdown, which drives educational system to uncharted territories at a very rapid pace with little or no time to adjust (Flugelman, Margalit, Aronheim, Barak, Marom, Dolnikov, Braun, Raz-Pasteur, Azzam, Hochstein & Haddad, 2021). Access to suitable and reliable technology was stated as a major problem to perform simulations and video demonstrations. Here are typical responses.

> *'No, our school does not have neither a laboratory nor any resources to implement practical examinations. In some years I get to an extent of buying material with my own money just to allow my kids to know what learning through practice is. Some*

*years I just omit the practical and let learners write a quick test to avoid getting into debts" (*T25 Appendix I)

This lack of resources for educators and learners of Life sciences remains one of the biggest challenges that face specifically poor South African schools. Basic education departments claims that its budget is skewed in favour of poor schools, but this research reveals dire situation (Maistry, 2021). Those schools that a department classified as quintile 1,2 and 3 or the so called no fee schools are the most suffering because they are based in poor areas. Life sciences educators go to the extent of borrowing equipment from nearby schools because they cannot wait for resources to be provided to them, that takes forever.

"No, the school does not have any resources, we normally borrow from neighbouring schools, but if learners break that equipment, I will be held responsible" (T31 Appendix I*)*

Apartheid legacy in South African schools and the consequent correlation between wealth and education means poor learners will perform worse academically (Spaull, 2013). This is regardless of the abolishment of racial segregation 20 years ago. Schools remain dysfunctional and are unable to implement basic practical examination to lower grades than Grade 12 because educators are trying to save little resources, they have for Grade 12 (Spaull, 2015). This confirms that grade 10 and 11 learners receive poor education at the expense of grade 12 learners.

"No, the school has no lab and as such the little resources the school has are meant for certain topics most of which are for Grade 12's" (T21 Appendix I)

Even the 4% of grade 10 and 11 Life Sciences educators who said their schools had resources also said they lacked the training to effectively use the resources for the successful execution of a practical (work) assessment. Educators' confidence in the implementation of a practical examination is affected by these difficulties. Lack of training give rise to lack of knowledge for educators, which becomes a challenge to some educators required to implement practical examination. The education white paper 6 also acknowledges this gap and calls inclusive education (DoE, 2011). It even announced the intention of minister of National Education to appoint the commission that will investigate educators training needs (Ladbrook, 2009).

Life Sciences educators further indicated through their responses that even those schools that have laboratories, are not well equipped, and they themselves lack training in the implementation of a practical examination (Kanamugire, Yadav & Mbonyiryivuze 2019). The training educators received from tertiary institutions needs to be perennial for improvement of their content delivery:

> *"No, as an old school educator I was trained in the more classical teaching of that time. It took some time to be acquitted with the new methods" (T19* Appendix I*)*

Through continuous learning, educators' skills would be supported that would in overall increase their knowledge and improve their teaching. The absence of this therefore makes it difficult for Life sciences educators to understand what is expected of them during practical examination implementation because they lack a clear vision of what it means to successfully implement practical examination.

> *"I am trained and qualified to teach Biology; however, I do not think the practical component of my course is adequate to conduct a demonstration or facilitate practical at school" (T29* Appendix I*)*

The department of basic education cannot expect educators to successfully implement practical examination because educators are not productive since they lack current and proficient tools to implement such assessment. Teaching style, technology, and skills changes over time, so the department must commit to training educators to prepare them for an ever-changing education system (Hampel & Stickler, 2005).

> *"No in my 27 years of teaching, I have never received any formal training on the implementation of practical examination; my plea is that the government must train us for some weeks, more especially during the end of the year vacations. So that we become used to them" (T23* Appendix I*)*

At least 98% of Grade 10 and 11 educators have complained that a practical examination does nothing except add to their workload and take their time, and they are not even supported to implement it. If the department is really concerned about learners' education, they should also care about educator's workload too, because it can contribute a great deal to educators' perception. Once educators stress level is too high it can interfere with their sleep, health and even their work quality (Samaden, 2021). Below are some views on this:

> *"At times it becomes difficult for you as an educator to improvise that contributes a lot in the learner's knowledge gap, I am also hesitant to improvise given the fact that some learners are allergic to some chemicals and others drink poisonous substances" (T11* Appendix I*)*

This causes educator turnover; you find most educators leaving classroom at least after one year. This will mean many learners are mostly taught by novice educators (Singer, 1993). The department experts more from educators then they support them. the mandate has increased but educational support has not increased including resources given to educators.

> *"Is strenuous since we have to teach other learning areas as well, the load is too heavy to carry since we lack infrastructure and chemicals to carry practical out" (T39* Appendix I*)*

Data presented in the table 1 below summaries the responses of 96% of Grade 10 and 11 educator's negative perceptions about the implementation of a practical examination that follows conducting practical examination. Contributing to this negativity is the fact that Grade 10 and 11 Life Sciences educators have little or no input in the structuring of the practical examination question papers. Educators are not happy that a practical examination comes in the form of written test with recall type questions, which they associate with theory rather than practice. Furthermore, the educators are worried by the fact that question papers received from the department are outdated, repetitive, not diverse and does not cover the whole scope of the content taught. Educators' perceptions are thought to have a negative impact on how they carry out their everyday teaching responsibilities (Tawana 2009). This in turn deprives learners of an opportunity for different types of assessments.

Table 1: Educators negative perceptions on practical examination

Perceptions	Number of educators	Percentage %
Lack of resources	43	96
Increase workload	44	98
Time-consuming	44	98
Educators are not well trained	43	96
No support for implementation	44	98
Less of it is practical, mostly theoretical	45	100
High numbers of learners per class	27	60
They cover narrow scope/ repetitive	18	40

Further insight into Grade 10 and 11 Life Sciences educators' perceptions and how they manage to implement a practical examination as required by CAPS is explored in section 4.4 below.

4.4 FINDINGS IN TERMS OF HOW EDUCATORS' CONDUCT A PRACTICAL EXAMINATION

This section presents and analyses data in answer to a sub-question of the investigation. 1: "How do Grade 10 and 11 Life Sciences educators conduct practical examinations?" According to Rogan and Grayson's (2003) design, the profile of implementation was used to analyse this study sub-question. Scientific in society, classroom interaction, assessment, and science practical examination are all sub-constructs of the construct. Guided by the construct, questionnaire responses were then divided into two core categories:

- Types of practical activities, educators implement in their classroom, and
- The methods used for such engagement.

According to questionnaire results, educators who administer practical examinations after doing practical examinations in their classrooms either utilize demonstrations, theoretical discussion, dissection, or the actual "doing" of a practical examination.

These methods for conducting a practical examination were categorized using the implementation profile developed by Rogan and Grayson. The classification of educators' behaviour is done as shown in Appendix J, along with how it influences the degree of implementation. The table will provide a clear explanation of how learners and educators interact with one another. Each of the four sub-constructs is an illustration of cutting-edge learner-centred practices.

Instead of the educator-centred strategy that CAPS suggests, you will stress a learner-centred approach as you move through the phases. Appendix J's depiction of Rogan and Grayson's degree of curriculum implementation gives further context for the various methods. These levels are not linear since they do not build upon one another. Higher levels, such as levels 3 and 4, include lower levels, like levels 2 and 3. The profile of implementation does not dictate what should be done by teachers or learners at any time. However, they do advise being proficient in a range of teaching and learning methods (Luvanga & Mkimbili; 2020). This makes it simple for educators to transition from level 2 to level 4 and back to level 3. Level 4 practices are not better to those at level 1 among all the levels (de Beer, 2020). Any level may be utilized to meet various curricular objectives (Hattingh, Aldous & Rogan; 2007).

By suggesting potential intervention options for each school, this sub-construct enables educators to gauge their degree of functioning at their respective institutions. Even though all teachers have the necessary certification to teach Life Sciences, they do badly when it comes to giving Life Sciences practical exams. This is a blatant sign that some teachers are not putting the curriculum's teaching strategies into practice. The table below displays Rogan and Grayson's various levels of curriculum implementation. Only 31percent teachers of learners in Grades 10 and 11 conduct practical exams with their learners. These educators can address the two separate goals of a life science program. By enabling learners to participate confidently and successfully in the practice of science, they may provide every learner a sufficient comprehension of Life Sciences (Millar,2004). Only 31percent teachers of learners in Grades 10 and 11 conduct practical exams with their learners. These educators can address the two separate goals of a life science program. By enabling learners to participate confidently and successfully in the practice of science, they may provide every learner a sufficient comprehension of Life Sciences (Millar,2004).

Many of the features that are present in level three appear to be appropriate for these educators in practice, even though educators have a little or non-existent involvement in the practical examination's structure. It should be noted, however, that educators, particularly those who lead practical exams, complain about it being a waste of time and that none of them comply with level 4 of Rogan and Grayson's implementation profile. The policy document itself gives educators little opportunity to meet Rogan and Grayson's level 4 implementation profile since it paces the curriculum using a tool called the annual teaching plan (ATP).

Grayson and Rogan Level one is educator-focused, and it advances to level two, which is learner-focused. The elements listed in Appendix J above assist in identifying if South African educators are at Level 1 or Level 4. These levels show different routes to different places, and they are also adaptable so that different teachers may interpret the curriculum (Mpanza, 2013). The fact that most South African schools perform between levels two and three, as determined by practical examination implementations, does not imply that all topics or the entirety of a subject should be at those levels. Schools could execute practical examinations at that level while delivering even worse results for a different construct. Due to a lack of resources, most South African schools are at level 1, whereas those with greater capability are at level 4. (Rogan & Aldous 2005).

Because of the pace of the curriculum, it is challenging for Life Sciences educators to support learners as they plan their practical activities over an extended period. Due to the short amount of time allotted for practical exercises, learners may find even basic tasks challenging and confusing to the point where they feel powerless in a Life Sciences classroom. The ATPs don't provide educators enough flexibility or time to organize and carry out practical exams, and they also make it challenging to undertake practical exams. An example of a typical answer from a teacher who uses "hands-on activities" is provided below:

> *"Hands-on safe activities where learners are doing the activities themselves" (T11* Appendix I)

At least 53percent of educators participate in demonstrations that are led by educators. To help learners improve their scientific notions, these educators employ demonstrations. Following these demos, learners are required to complete a worksheet. This strategy pushes some learners back while others move more quickly, which lowers learners' morale in the Life Sciences classroom. Even though this method enables a learner to take in observations without being engaged in the equipment's operation, not all teachers use it. Here are some quotes from educators that demonstrate this:

> *"Demonstrations since there are no resources, it is easier for me to demonstrate to the learners the practical and they will answer the questions after observing" (*T33 Appendix I*)*

Nevertheless, engaging in practical work is vital to helping learners comprehend scientific principles and procedures. It may be owing to the several variables described above, including laboratory equipment, classroom space, and information and communications technology (ICT), that practical examination implementation in secondary schools is neglected.

> *"One that involves learners observing a demonstration or experiment rather than them handling apparatus because they will have to be strictly monitored by more than one educator" (*T23 Appendix I*)*

Practical exams, according to the National Curriculum Statement (NCS), give learners a chance to do research. Learners should actively participate in the exploration process. However, the demonstration approach deprives learners of the chance to operate equipment as prescribed by the curriculum.

According to Rogan and Grayson's (2013) theory, these educators can introduce their learners to fundamental process skills. However, depending on demonstrations could be a sign of reluctance to adopting learner-centred practice, which is supported by CAPS policy (Samaneka, 2015). Looking at the educator's well-being component as shown in Appendix J, we can see that these educators lack confidence and feel overburdened, under pressure, challenged, and frustrated. The adoption of practical examinations cannot thus be expected to make such educators pleased (Sousa 2016), as evidenced by their replies to the survey.

Other than dissection, there are a variety of reasons that limit teachers' options for Grades 10 and 11. Avoiding classroom disruption (particularly in big classrooms), a lack of equipment, insufficient expertise, or ineffective professional development are some of the contributing causes.

Putting practical assessments into practice is a dynamic learning process, according to all educators. But it's not obvious how disorder connects to standards or whether the disarray is a sign of learning. Teachers should establish objectives for how they will conduct practical exams (Hofstein, 2004). To ensure that learners understand and can articulate these objectives to anybody who enters the Life Sciences Practical Examination classroom, more explanation of these aims is required. When asked what they are doing, learners should be prepared to elaborate and state their learning objective explicitly. They also want reminders on what to anticipate during their practical examinations, not just to earn marks but also to gauge their understanding of scientific topics (Turner & Dankoski, 2008).

At least 11 percent of Life Sciences educators in grades 10 and 11 turn practical exams into theoretical.

> *"It is not a good thing since it is done theoretically. The department should ensure that all schools have laboratories if they want to continue with practical examination" (T2* Appendix I).

This implies that teachers of Life Sciences in Grades 10 and 11 only convey ideas that their learners were meant to study through hands-on assessments. Teachers want their learners to comprehend the ideas after presenting the theory of the practical assessment. Which practical skill are learners learning in such a substandard way, one would wonder?

At least 4% of participants admitted that they never take any kind of practical exam. The CAPS standards, including those for Continuous Assessment (CASS) and the requirement for practical skills that learners are intended to develop through practical testing, are broken by these educators. This raises concerns regarding their credentials and the process employed to obtain marks on the practical examination. No level of Rogan and Grayson's profile embraces this practical implementation-oriented behaviour. If it must be included, this might be referred to as a level zero. This behaviour is also not permitted by the CAPS document.

Conduct	**Category**	**Number of educators**	**Percentage (%)**

Type of practical examination conducted by educators	None	2	4
	Demonstration	24	53
	Theoretical	5	11
	Practical/ Dissection	14	31
Method used to implement practical examination	None	2	4
	Educator centred	33	73
	Learner-centred	8	18
	Both educator and learner involved	2	4

Table 2: Data from a questionnaire on how educators perform practical examinations.

When asked about their opinions about practical assessment, most educators responded, "It allows learners to be hands-on and minds-on," even though almost none of their actions matched their real practice. This result is corroborated by the fact that 53 percent of educators employ demonstrations, compared to 31 percent who use real-world exams. However, some educators are still thought to not be using practical exams at all, instead choosing to give learners "ghost marks".

Teachers are required to submit certain marks in the portion of the South African School and Administration Management System (SA-SAMS) designated for practical exam. SA-SAMS is a computer program designed to administer, control, and meet the management requirements of South African schools (Singer, 1993). This begs the question of what marks are used by educators who do not execute practical activities, such as the practical examination, to fill up such spaces (Hofstein & Kind, 2012).

Another interpretation of the results is that little to nothing has been done to guarantee that the actual implementation takes place, despite the CAPS policy document's focus on conducting practical assessments and executing practical examinations at the end of the year (Mertler, 2016). This is even more evident from the response of educators such as, "*No, we can't do it because of lack of equipment, laboratory and the chemicals".* This demonstrates that by withholding or manipulating equipment, learners in these schools are denied the chance to watch or take a practical exam. As a result, there is a mismatch between the curriculum's requirements and goals (Kurup, Powell & Brown;

2019). Additionally, according on Appendix J above's Life Sciences well-being for Grades 10 and 11, these educators lack confidence.

The absence of workshops for curriculum implementation is one of the possible causes of educators' lack of confidence, which warrants more investigation (Mwala, 2019). Corona Virus-19 (Covid-19) era, where learners are now required to occasionally learn remotely from home, exacerbates this lack of trust (Murphy, C., Marcus-Quinn & Hourigan, 2021). Even though the department of basic education responded quickly to the issue, studies reveal that educators are still unsure about how well remote learning is delivered. This had such a negative impact on the practical exam (Ramrathan, 2020) The restrictions that educators face while conducting a practical examination were thus made clear by the discussions; the next reasonable inquiry is what those limitations are. The second research sub-question will be covered in the next section. It asks, "What limitations have Grade 10 and 11 Life Sciences instructors identified as being connected to practical examination?"

4.5 FINDINGS IN TERMS OF LIMITATIONS ASSOCIATED WITH PRACTICAL EXAMINATION

What limits have Grade 10 and 11 life sciences educators recognized as being connected to practical examination? is the second research sub-question that this section tries to address.

As was noted in Chapter 3, this question was addressed using the questionnaire's data, and the analysis of the data was done using Rogan and Grayson's profile. The structure provided by Rogan and Grayson is shown in Appendix K which demonstrates how the capacity for innovation was used to divide the administration of practical exams by Grade 10 and 11 educators into four limiting factors. These are the elements:

- Physical resources,
- Educators,
- Learners,
- School ecology and administration.

The second study sub-question, "What constraints have Grade 10 and 11 Life Sciences educators recognized to be connected with practical examination," is addressed in this section.

According to this qualitative study, there are specific issues that teachers of grades 10 and 11 deal with. L ack of information causes problems for certain educators. However, once all these issues are fixed, Grades 10 and 11 Life Sciences educators will be better prepared to administer Life Sciences practical examinations.

With a few adjustments, the Framework Capacity to Innovate may be used in Life Sciences classes. It's also important to note that all innovation capability levels show a trend toward increased use of practical examination, for instance (Lelliott, Mwakapenda, Doidge, Du Plessis, Mhlolo, Msimanga, Mundalamo, Nakedi & Bowie, 2009). For educators to advance to stages 3 and 4 of this capacity to innovate, their qualifications are also essential. Research has revealed that practical learning enhances learners' performance in the Life Sciences. Therefore, introducing practical exams might increase educators' capacity for innovation by giving them a means to advance NCS objectives like problem-solving skills (Badugela, T.M., 2012).

The failure of educators to innovate may also be due to the disconnect between what is reflected in teaching and learning research and what educators practice in the classroom. Although teachers lack the requisite equipment, labs, and textbooks, they nonetheless have large classes to manage and conduct practical exams in. These factors affect how a practical examination is conducted after another practical examination.

> "*Lack of resources disadvantages learners because they are not experiencing the real science world/ practical, therefore they must learn by memorization and theory than exploration and discovery. Sometimes learners would use imaginations"* (T25 Appendix I).

The low performance of Life Sciences in secondary schools is mostly due to a lack of laboratories and texts (Jepkoech, 2020). Schools should devise a way to give learners access to simulation computers, experiment supplies, and textbooks. To guarantee the usage and supply of science equipment, district employees should visit schools often. The department of basic education should also assist with these requirements (National Research Council, 1996). The majority of Life Sciences educators think that learners perform worse when there is scarcity of science equipment (Xolisile & Bekithemba, 2021).

> *“Lack of resources has negative impact on learners’ results, the high failure rates of Life Sciences are caused by shortage of resources. Availability of apparatus can ensure that meaningful science takes place in an effective way”* (T21 Appendix I).

Such statements confirm the effects of not having the necessary equipment to carry out a practical examination. According to published data, 89 percent of schools lack laboratories, and even those that have (Motlhabane 2013) do not use them because of inadequate training or equipment. Samaneka (2015), Muwanga-Zake (2008), and Rollnick, Bennett, Rhemtula, Dharsey, and Ndlovu (2008) all claim that a lot of schools are short on the necessary supplies to do practical exams. Due to a shortage of resources, educators are forced to conduct practical examinations using demonstrations and/or theory. Some educators just give up and do not conduct practical test at all. The cost to learners of developing the abilities required by CAPS is quite high. Large class sizes may also make it difficult for learners to fully participate in their practical exam because of a lack of space. In turn, this makes it challenging for teachers to maintain control over their courses and to move around freely while they show their learners how to take a practical exam. These claims are supported by educators' responses, which show that learners will begin to lose interest in the course if teachers remain in place without moving:

> *“Successful implementation of a practical examination would make teaching effective but now it’s chaos and waste of time because most learners do not even have the ability to follow instructions”* (T36 Appendix I).

Statistics show that 96% of teachers are short on equipment, and those who do have equipment don't use it. The capacity to invent is categorized as level one resource availability in Rogan and Grayson's paradigm. According to Rogan and Grayson, level one indicates a poor level of practical application in the Life Sciences, whereas a high number indicates learner-centred practices. The practical experience of those who achieve a level one score is restricted to teacher demonstrations. One of the factors that affects the execution of a practical test after passing a practical exam is also described as being the learners (Hattingh, Aldous & Rogan; 2007). Learners have language barrier and the lack of discipline imposed by the big classrooms.

“*I personally do not enjoy doing practical examination because I have large numbers, it is not easy. Imagine having 185 learners in one class”* (T30 Appendix I).

There are still schools in South Africa where classes have more than 85 learners even though the average class size is still 30 learners to one teacher (Kumar, 1992). Since most work is done in groups, this study recognizes that having a big class size has certain benefits, such as reducing stress and boosting energy levels among learners. It is also agreed that big classrooms are economical, but in terms of teaching and learning, the drawbacks outweigh the benefits (Hayes, 1997).

Large classes, however, as highlighted by Life Sciences educators, result in a lack of connection between teachers and even learners. Additionally, they cause disengagement, poorer learner collaboration, and a higher rate of learner dropout. Problematic diversions are also present in teachers' huge classrooms, which prevent them from giving each learner the attention they need (Carpenter, 2006).

“Some learners carry out instructions in a wrong way leading them to wrong results or disaster” (T19 Appendix I).

Large classes, however, as highlighted by Life Sciences educators, result in a lack of connection between teachers and even learners. Additionally, they cause disengagement, poorer learner collaboration, and a higher rate of learner dropout. Problematic diversions are also present in teachers' huge classrooms, which prevent them from giving each learner the attention they need (Carpenter, 2006).

Another noted element influencing the implementation of practical examinations is the school atmosphere (Davis & Taylor-Vaisey, 1997). This may be attributable to the nature of teaching and learning in classrooms as well as the little support Life Sciences educators in grades 10 and 11 receive from their supervisors or the school administration.

Grades 10 and 11 Life Sciences educators have the same work schedules for planning, timetabling, and invigilation timetables as other educators. Since schools do not include practical examinations on their exam or assessment timetables, Life Sciences educators must further go above and beyond to organize and ask for help from colleagues in invigilating and monitoring learners while they take such examinations.

> *"Practical exams always come late, and learners receive question papers before educators could have it, it is only written as theory and not done practically. This is time waste"* (T22 Appendix I).

If young learners in Grades 10 and 11 are implicated in crimes of this nature, it is also concerning. In recent years, the leaking of exam papers has been a common occurrence (Haque, 2019). This in and of itself raises concerns about the quality of the Life Sciences practical exam and the subsequent outcomes.

> *"We don't do practical exam more often, we only do them when we have enough resources"* (T7 Appendix I).

These schools don't appear to be executing a practical examination in the manner that CAPS mandates due to their culture of learning. Learners don't seem to be following the school's code of conduct and lack discipline. This behaviour brings up several important questions, including who in the school oversees learner discipline? Are the administration of the school enforcing rules or a code of conduct? What type of practical exam is possible if the question paper is sent late? If teachers are working under these types of time restrictions, do they complete the curriculum?

Most school principals lack a background in science; thus, they are unaware of the requirements for implementing practical examinations (Furiwai & Singh-Pillay, 2020). For many schools, policing, scheduling, and equipment procurement become issues. When it comes to permitting their learners to take the practical exam, educators seem to face several challenges. The assistance of Grade 10 and 11 Life Sciences educators by their management might greatly assist in the success of practical examination implementation; nevertheless, it does not need completing mark sheets with practical marks. A practical examination should be administered in the same manner as other exams, and authorized invigilators should be chosen to supervise it. If Life Sciences educators are required to set up the examination venue for practical examination implementation, that should also be considered in the calculation of their workload. Rogan and Grayson classify these schools at level one.

Level one for schools indicates a poor implementation of the curriculum, but this does not reflect developmental level, therefore it does not indicate the lowest form of practice; rather, it refers to the style of lesson conducted in schools, whether it is learner-centred or only educator-centred (Mtetwa, 2005). Due to the lack of Life Sciences practical examinations, the use of demonstrations placed schools at level one. These schools will stay at level one if they don't try to move from where they are now, or if they stay at frying pan.

The information acquired through the questionnaire demonstrated the training and confidence of the educators. Most educators said they need help because the CAPS requirements for practical examination, which are detailed below, leave them feeling uncomfortable, uncertain, and overwhelmed. Approximately 96 percent of educators agreed that they are not adequately trained to implement practical examination in their classrooms.

> *"I am not adequately trained; I only remember engaging in practical activities four or five times as a learner. As an educator, I was never trained how to facilitate or guide learners through practical activities"* (T28 Appendix I).

To help science educators become more effective in their positions, there should be a balance between the time spent on initial educator training and ongoing professional development. This would broaden their pedagogical understanding and provide a connection between research, policymaking, and teachers' classroom practices (Kaptan & Timurlenk, 2012).

> *"I am not adequately trained, that is the reason why I normally do the practical activity alone before I engage learners"* (T43 Appendix I).

Teachers of Life Sciences in Grades 10 and 11 feel pressured out and overburdened by the CAPS requirements of an examination. This is a result of insufficient teacher preparation. Given that educators explicitly state in the comments above that they have never attended a workshop for the implementation of practical examinations, whatever help is provided to them is insufficient. This begs a lot of issues, such as how can an educator succeed in the real world when they never had the proper training? Because the educator was only taught in their tertiary institution in the management and usage of the equipment, improvising gets much worse. Being taught is different from being told what to do (Bovill 2019); for teachers to be successful in delivering their lessons, they must have a style of teaching (Sartika & Advinda 2020). At levels one and two, educators employ Rogan and Grayson's implementation profile.

4.6 CONCLUSION

This chapter's goal was to address both the primary research topic and the two sub-questions.

The primary research question was answered using information from the surveys and content analysis. Analysis showed that teachers of learners in grades 10 and 11 had various opinions on how practical examinations are implemented. Two main categories, including negative and positive impressions, were used to classify such perceptions (Mamba & Putsoa 2018). Only 2% of educators believe that practical exams should be used; these perspectives might also be categorized as negatives because these educators still believe that practical exams will add to their workload and do not see the need for their use.

The 96% of educators who hold different opinions have bad perceptions about practical exams in general. Although the 96% regard the practical examination as equally important as the practical examination, it is concerning that they still have a bad impression of it. Lack of adequate training, workload allocation, inadequate assistance from the school management team or the Department of Basic Education, and even a lack of funding might all be factors in the negative image.

The first study sub-question, "How do Grade 10 and 11 Life Sciences educators administer a practical examination," was addressed using the questionnaire data analysis and Rogan and Grayson's (2003) profile of curricular implementation. Life Sciences teachers in grades 10 and 11 work to use dissection/actually doing practical examination, demonstrations, and theory that only involves discussion of practical examination to adhere to the curriculum criteria. Nevertheless, given the numbers, it is important to note that, although being mandated by CAPS policy, some schools choose not to undertake any practical assessments at all. Further emphasis was placed on the possibility that there is a discrepancy or gap between educators' perceptions on a practical assessment, their degree of professional development, their actual classroom practice, and what CAPS expects of them (Mollet, Stier, Linley & Locke 2020).

Data was analysed using Rogan and Grayson's construct, ability to innovate, to answer study sub-question two, which questioned about the limits mentioned by Grade 10 and 11 Life Sciences instructors as being related to practical assessments. Teachers of life science in the tenth and eleventh grades provide extensive courses, lack laboratories, have few books, and have little to no equipment in their classrooms. The use of the wrong teaching language, learner disobedience, parental support, and classroom congestion all prevent learners from participating fully in practical exams. Roadblocks to the successful implementation of practical exams in schools include the inherent limits of the institution, the culture of teaching and learning, management support, time tabling, invigilation, and preparation. The following details are actual interactions and encounters with Grade 10 and 11 educators on carrying out a practical assessment as required by CAPS, and they raise the question of how to do so in the absence of materials and sufficient training in such a deplorable school environment. In the last chapter, the findings' importance will be examined.

CHAPTER 5

DISCUSION AND RECOMMENDATION

5.1 INTRODUCTION

While attempting to address the research questions, this chapter provides a discussion and conclusion influenced by the study's findings. The study's recommendations, consequences, and limitations are explored.

The purpose of this study was to see how educators felt about Life Sciences practical being included in Grade 10 and 11 examinations. The study's goal was to find answers to the following research questions.

- What are the perceptions of Grade 10 and 11 Life Sciences educators towards the implementation of practical examinations?
  - How do Grade 10 and 11 Life Sciences educators conduct a practical examination?
  - What limitations have Grade 10 and 11 Life Sciences educators identified to be associated with a practical examination?

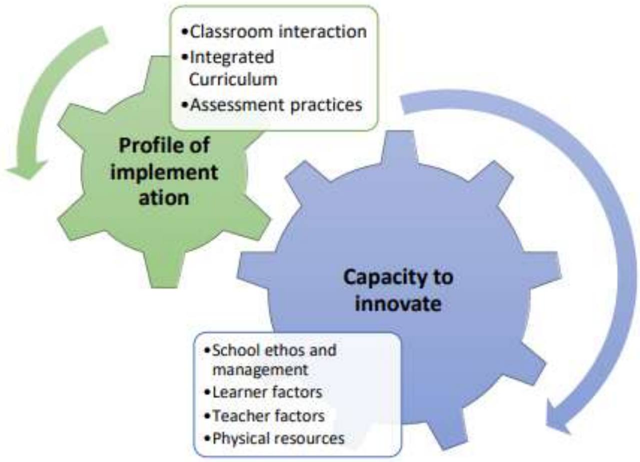
5.2 RESEARCH DESIGN AND METHOD

Because the researcher sought to gather data in the form of words rather than numbers, this study adopted a qualitative methodology (Mc Millan & Schumacher 2010). This made it possible for the researcher to document changes in a natural environment and comprehend the perspectives of others (Denzil, 2005). (Cresswell 2013). The researcher decided on a qualitative approach because they wanted to understand how teachers in grades 10 and 11 feel about the introduction of a life sciences practical exam. A qualitative approach also gave educators the freedom to independently consider the questions (McMillan & Schumache 2010) and express their own views on the implementation's significance. This approach did not limit teachers to multiple-choice questions with no other possible answers (Merriam 2002).

The research was conducted according to an interpretivism paradigm. According to Cohen et al., this paradigm aims to accurately record and communicate the research participants' real experiences (2011). Using this paradigm, the researcher was able to get information from Grade 10 and 11 Life Sciences instructors on the implementation of practical tests in the field of life sciences.

5.3 SUMMARY AND INTERPRETATION OF RESULTS

This study was built on the Rogan and Grayson hypothesis, which highlighted the ongoing inconsistency between curriculum implementation (O'Keefe & Ward, 2018) in terms of the implementation profile and the capacity to encourage innovation. Figure 4 illustrates the relationship between curriculum implementation, assessment techniques, and inventiveness.



(Mutembi, 2019)

Figure 4: Mutembi (2019) theory of curriculum implementation

The diagram demonstrates the link between the ability to innovate and the adoption of curricula. Additional aspects that affect a school's capacity to innovate include its administration, educational ethos, learner and educator characteristics, and physical resources. Lack of which has a detrimental effect on the implementation profile, which in turn would affect how educators connect with their learners, integrate the curriculum, and conduct and assess practical work. These techniques were categorized by Rogan and Grayson (2003) into levels of operations, with level 1 being the lowest and level 4 the highest. commendable.

Table 3: Classification framework as per levels of complexity in Life Sciences Practical

Level	Types of science practical work
1	➢ Teacher uses classroom demonstrations to help develop concepts. ➢ Teacher uses specimens found in the local environment to illustrate lessons.
2	➢ Teacher uses demonstrations to promote some form of learner inquiry. ➢ Some learners assist in planning and performing the demonstrations. Learners participate in closed (cook-book) practical work. ➢ Learners communicate data using graphs and tables.
3	➢ Teacher designs practical work in such a way as to encourage learner discovery of information. ➢ Learners perform guided discovery type practical work in small groups engaging in hands-on activities. ➢ Learners can write a scientific report in which they can justify their conclusions based on the data collected.
4	➢ Learners design and do their own 'open-ended' investigations. ➢ Learners reflect on the quality of the design and data collected and make improvements when and where necessary. ➢ Learner can interpret data in support of competing theories or explanations.

(Hattingh, Aldous & Rogan; 2007)

As unpredictable factors, physical resources, learner factor, school ethos, and educator factor have all been identified. Most teachers employ demonstrations to encourage learning and to develop ideas. Additionally, they use cookbook practical work. None of the respondents mentioned that their learners conduct independent research or understand, justify, and debate theories. Therefore, none of the educators fit into categories 3 and 4; instead, the majority fit into categories 1 and 2, if not category 0. For instance, classroom activities are not necessarily related to the environment, which makes the framework for implementing the curriculum simple. Understanding the impact of various elements on the ability to foster creativity is crucial as a result. Rogan and Grayson's method demonstrated every essential build-up in accordance with the curriculum's design. In terms of practical work, the kind of practical work, the frequency of practical work, and the level of engagement, the implementation profile paints a complete picture of classroom activities.

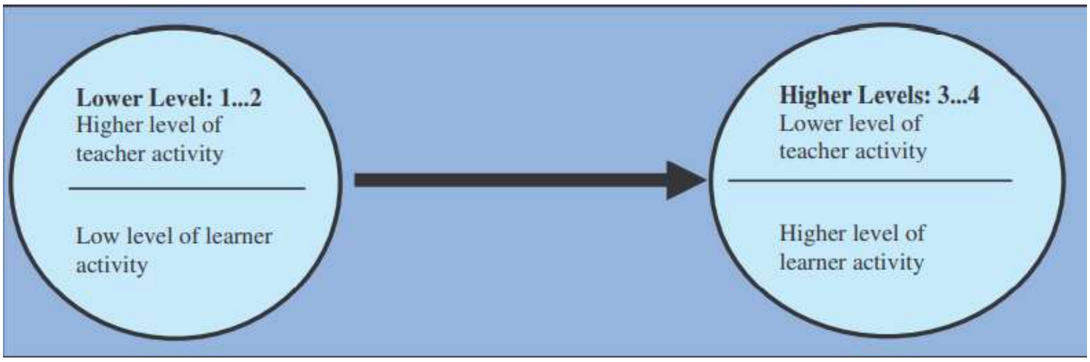


Figure 5: Levels of implementation as adapted from Tawana (2009).

For curricular implementation, each sub-construct is divided into four levels, numbered from 1 to 4. The profile of how the curriculum is being implemented can be used to show how learning has evolved from educator-centred to learner-centred teaching (Rogan, 2007). Higher-level activities for learners are seen in Figure 5, their exercises are more open-ended and inquisitive (Motswiri, 2004). The lowest level of operation for the South African curriculum is shown in educators' activities. Even if the lowest level of curriculum implementation also covers the highest level, the lower levels are contrasted with outside agencies and profiles of competency to promote innovation, and are shown to have dysfunctional management, subpar resources, and underqualified instructors. South African schools will find it challenging to go from these lower levels to higher levels since they have not demonstrated a greater ability to apply our curriculum.

On the other hand, the capacity to assist profile identifies teachers, school culture, material resources, and learners as barriers to a successful practical examination. It emphasizes that these are the elements that need to change to aid CAPS policy implementation rather than hinder it. Teaching and learning are impacted by a variety of factors, including instructional language, professional development for teachers, and school culture. It is necessary to have an advanced capability for providing high-quality education. To apply curriculum effectively, educators must be committed to developing their implementation skills. This includes physical factors, educator development, learners, school ethos, and ecology.

The health of the grade 10 and 11 Life Sciences teachers is an indicator of curriculum change exhaustion. The fact that South Africa has experienced three large curriculum modifications in a short period of time without supplying a favourable environment for educators to implement the curriculum serves as additional support for this. A practical educator needs to be constantly learning new skills and be creative to apply the curriculum.

5.4 CONCLUSION

The CAPS policy is well-known and specifies the competencies that learners must gain via practice (practical activities as well as practical examination). The learner-centeredness that the curriculum promotes must be adopted throughout teaching and learning. The policy also emphasizes skills in equipment handling, data recording, following directions, taking measurements, experiment design, and experiment interpretation. This is a type of practical task that learners should do to strengthen their investigative and problem-solving skills.

However, the results show that teacher-led presentation is the predominant form of exposure for learners. Life Sciences teachers in grades 10 and 11 no longer adhere to the curriculum's ideals. Without adequate resources being made available for the implementation of practical activities, the CAPS requirements for practical examination will not be met, and this deviation can be directly attributed to a lack of school managers' capacity, ignoring educators' professional development, and neglecting educators' professional development.

5.6 RECOMMENDATIONS

The study's findings demonstrate that educator practices do not correspond to those required by the curriculum. Teachers' perceptions on practical work vary, which has an impact on how practical exams are conducted. Here are some suggestions to enhance quality and strategies to conduct practical examinations.

5.6.1 In-service training

According to Liberman and Mace (2008) and Sigh-Pillay and Samue (2015), educator readiness and preparedness are essential for ensuring that curriculum concepts are implemented. Thus, via efficient professional development, educators may alter their teaching methods. Because it disregards the varied experiences, learning requirements, and learner backgrounds of educators, curriculum advisor-led cascade educator development is inefficient. Teachers' professional development must create a stimulating atmosphere where they may increase their knowledge, practice, and learning. An evaluation of each educator's pedagogical needs should be the first step in any professional development for educators. All assistance given to educators must be customized to meet their unique needs and provide them the chance to practice the skills they will need to impart to their learners.

5.6.2 Capacitation of school management team

Subject advisors must try to inform the management of the school about the standards for a practical examination. The administrative requirements for a practical examination, such as scheduling, invigilation, and time allocation for laboratory administration, must be part of the duties of teachers in grades 10 and 11. All examination rules must be adhered to during a practical test, including the necessary 1:30 educator to learner ratio.

5.6.3 Physical resources

If the objectives of the Life Sciences strategy are to be achieved, it is imperative that schools obtain all the resources required to carry out a practical examination. Allow Life Sciences teachers in grades 10 and 11 to illustrate how to improvise when financial restrictions make that option unavailable. For both new and experienced educators to acquire some of the most efficient techniques for performing practical work, the circuit should also promote staff exchange programs.

5.7 LIMITATION OF THE STUDY

If the objectives of the Life Sciences policy are to be achieved, it is essential that schools obtain all the equipment required to conduct a practical exam. Allow Life Sciences teachers in grades 10 and 11 to demonstrate how to improvise in situations where budget restrictions prevent that provision. Additionally, the circuit needs to support staff exchange programs so that both new and seasoned educators can learn some of the best practices for conducting practical work.

5.8 CONCLUDING REMARKS

There is a discrepancy between classroom practice in Grades 10 and 11 Life Sciences and the curriculum requirement when it comes to practical examination execution. Contextual difficulties that teachers encounter because of inadequate professional development The recommendations addressed a lack of professional development, the urgent need to guarantee the availability of physical resources, and the necessity to train the school administration staff how to conduct practical assessments.

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APPENDIX A: SAMPLE OF QUESTIONNAIRE – EDUCATOR'S QUESTIONNAIRE

Dear Sir/ Madam

This questionnaire is part of a study aimed at obtaining information on educator's perceptions on the implementation of practical exams in Life Sciences. Your objective response will constitute a strong empirical basis upon which policies aimed at improving the teaching of Life Sciences through practical examination will be based.

Confidentiality, except for the above purpose, in respect of whatever information you give is fully assured.

Thank you.

QUESTIONNAIRE ON EDUCATORS' PERCEPTIONS ON THE IMPLEMENTATION OF PRACTICAL EXAMS IN LIFE SCIENCES

Please complete the information needed below:

Section A

Age:____

Gender:_____________________________________

Numbers of years teaching (General):_____________

Number of years teaching Life Sciences:__________

Qualification/s:_______________________________

Qualification in Life Sciences:___________________

____

Training in Life Sciences Practical exam implementation attended:

____

Periods of Life Sciences taught in one week:________

Total Life Sciences periods per workload:__________

Other learning areas taught:____________________

____

Number of periods these learning areas contribute to workload:

____

Level of employment:_________________________

Nature of appointment:________________________

Section B

1. Please elaborate on your perceptions of practical examination

2. Do you enjoy doing practical examination with the learners? Please explain.

3. Do your learners enjoy practical examination? Please explain.

4. What were the most positive experiences that you had when implementing practical examination? Please explain.

5. What were the most negative experience/ problems or difficulties that you had with the implementation of practical exam? Please explain.

6. How often do you do practical examination in your Life Sciences classes? Please explain.

7. What type/ types of practical examination do you engage learners in or prefer to engage learners in? Please elaborate.

8. Do you have the resources to engage in practical examination? Please explain.

9. Do you feel you are adequately trained to implement the demands made on you in respect of the practical examination and the practical examination?

10 What are your perceptions on the practical exams that the grade 10 and 11 Life Sciences learners must write? Please explain.

11 Does having to implement the practical exam your workload, teaching, and testing? If so, how? Please explain.

12 What impacts the implementation of the practical exam in your school? Please explain.

13 What strategies/ methods do you use to improvise for resources that are lacking at your school for practical examination/ exams? Please explain.

14 Do you consult with learners for resources? Please explain.

15 What support structures are available to you for the implementation of practical examination/ practical exam in your school/ cluster/ ward/ district? Kindly explain.

16 Do you work closely with other Life Sciences educators when it comes to practical exams and practical examination? Please explain.

17. What are the benefits of Practical examination?

18. What are limitations to the implementation of practical examination?

APPENDIX B: ETHICS CLEARANCE CERTIFICATE

UNIVERSITY OF LIMPOPO

University of Limpopo
Department of Research Administration and Development
Private Bag X1106, Sovenga, 0727, South Africa
Tel: (015) 268 3935, Fax: (015) 268 2306, Email: anastasia.ngobe@ul.ac.za

TURFLOOP RESEARCH ETHICS COMMITTEE

ETHICS CLEARANCE CERTIFICATE

MEETING: **05 November 2019**

PROJECT NUMBER: **TREC/390/2019: PG**

PROJECT:

Title: An Exploration of educators' perceptions of the implementation of Life Sciences practical in Grade 10 and 11 examinations in the Capricorn South District, South Africa
Researcher: SZ Motaung
Supervisor: Prof MS Mtshali
Co-Supervisor/s: N/A
School: Education
Degree: Master of Education in Science Education

PROF P MASOKO
CHAIRPERSON: TURFLOOP RESEARCH ETHICS COMMITTEE

The Turfloop Research Ethics Committee (TREC) is registered with the National Health Research Ethics Council, Registration Number: **REC-0310111-031**

Note:

i) **This Ethics Clearance Certificate will be valid for one (1) year, as from the abovementioned date. Application for annual renewal (or annual review) need to be received by TREC one month before lapse of this period.**

ii) **Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee, together with the Application for Amendment form.**

iii) **PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.**

Finding solutions for Africa

APPENDIX C: LETTER TO THE DISTRICT DIRECTOR

Private Bag X1106
Sovenga
0727

The District Director,

Sir/Madam,

Permission to conduct research.

My name is Steven Zuzidlelenhle Motaung, I am a master's candidate studying at the University of Limpopo, Turfloop campus, South Africa. I am conducting research on Grade 10 and 11 Life Sciences Educators' perceptions on the implementation of Life Sciences practical in grade 10 and 11 examinations at selected high schools in the Capricorn district.

To gather the information, I will need access to grade 10 and 11 Life Sciences to answer a questionnaire. Permission will also be sought from the individual educators. Every participant to this study has the right to withdraw from the study at any time. I can be contacted as follows:

Cell.No:0723088000

E-mail: Motaung.steven@gmail.com

My supervisor is Prof SM Mtshali who is located at the School of Education, Turfloop campus of the University of Limpopo.

Contact details: sibusiso.mtshali@ul.ac.za Tel: 015-268 2388

Thank you for your contribution to this research.

APPENDIX D: PERMISSION FROM THE DEPARTMENT OF BASIC EDUCATION

LIMPOPO

PROVINCIAL GOVERNMENT

REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF

EDUCATION

Ref: 2/2/2 Enq: Mabogo MG Tel No: 015 290 9365 E-mail:MabogoMG@edu.limpopo.gov.za

Motaung SZ
786 Unit F Mankweng
Sovenga
0727

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH

1. The above bears reference.
2. The Department wishes to inform you that your request to conduct research has been approved. Topic of the research proposal: **"AN EXPLORATION OF EDUCATORS PERCEPTIONS OF THE IMPLEMENTATION OF THE LIFE SCIENCE PRACTICAL IN GRADE 10 AND 1 EXAMINATION IN LEBOWAKGOMO DISTRICT"**
3. The following conditions should be considered:

3.1 The research should not have any financial implications for Limpopo Department of Education.

3.2 Arrangements should be made with the Circuit Office and the School concerned.

3.3 The conduct of research should not in anyhow disrupt the academic programs at the schools.

3.4 The research should not be conducted during the time of Examinations especially the fourth term.

3.5 During the study, applicable research ethics should be adhered to; in particular the principle of voluntary participation (the people involved should be respected).

3.6 Upon completion of research study, the researcher shall share the final product of the research with the Department.

REQUEST FOR PERMISSION TO CONDUCT RESEARCH: MOTAUNG SZ

CONFIDENTIAL

Cnr. 113 Biccard & 24 Excelsior Street, POLOKWANE, 0700, Private Bag X9489, POLOKWANE, 0700
Tel: 015 290 7600, Fax: 015 297 6920/4220/4494

The heartland of southern Africa - development is about people!

4 Furthermore, you are expected to produce this letter at Schools/ Offices where you intend conducting your research as an evidence that you are permitted to conduct the research.

5 The department appreciates the contribution that you wish to make and wishes you success in your investigation.

Best wishes.

Ms NB Mutheiwana
Head of Department

27/11/2019
Date

REQUEST FOR PERMISSION TO CONDUCT RESEARCH: MOTAUNG SZ

CONFIDENTIAL

APPENDIX E: A SAMPLE OF (9) LETTERS TO CIRCUIT MANAGERS

Private Bag X1106
Sovenga
0727

The Circuit Manager,

Sir/Madam,

Permission to conduct research.

My name is Steven Zuzidlelenhle Motaung, I am a master's candidate studying at the University of Limpopo, Turfloop campus, South Africa. I am conducting research on Grade 10 and 11 Life Sciences Educators' perceptions on the implementation of Life Sciences practical in grade 10 and 11 examinations at selected high schools in the Capricorn district.

To gather the information, I will need access to grade 10 and 11 Life Sciences to answer a questionnaire. Permission will also be sought from the individual educators. Every participant to this study has the right to withdraw from the study at any time. I can be contacted as follows:

Cell.No:0723088000

E-mail: Motaung.steven@gmail.com

My supervisor is Prof SM Mtshali who is located at the School of Education, Turfloop campus of the University of Limpopo.

Contact details: sibusiso.mtshali@ul.ac.za Tel: 015-268 2388

Thank you for your contribution to this research.

APPENDIX F: SAMPLE OF (45) LETTERS TO THE PRINCIPALS

Private Bag X1106
Sovenga
0727

The principal,

Sir/Madam,

Permission to conduct research.

My name is Steven Zuzidlelenhle Motaung, I am a master's candidate studying at the University of Limpopo, Turfloop campus, South Africa. I am conducting research on Grade 10 and 11 Life Sciences Educators' perceptions on the implementation of Life Sciences practical in grade 10 and 11 examinations at selected high schools in the Capricorn district.

To gather the information, I will need access to grade 10 and 11 Life Sciences to answer a questionnaire. Permission will also be sought from the individual educators. Every participant to this study has the right to withdraw from the study at any time. I can be contacted as follows:

Cell.No:0723088000

E-mail: Motaung.steven@gmail.com

My supervisor is Prof SM Mtshali who is located at the School of Education, Turfloop campus of the University of Limpopo.

Contact details: sibusiso.mtshali@ul.ac.za Tel: 015-268 2388

Thank you for your contribution to this research.

APPENDIX G: SAMPLE OF (45) LETTER TO EDUCATORS

Private Bag X1106
Sovenga
0727

The Research Participant,

Sir/Madam,

Permission to conduct research.

My name is **Steven Zuzidlelenhle Motaung**; I am a master's candidate studying at the University of Limpopo, Turfloop campus, South Africa. I am conducting research on Grade 10 and 11 Life Sciences Educators' perceptions on the implementation of Life Sciences practical in grade 10 and 11 examinations at selected high schools in the Capricorn district.

To gather the information, I will need you (as Grade 10 and/ 11 Life Science educator) to answer a questionnaire. I will leave the questionnaire with you for a period of two weeks, this is to allow you sufficient time to go through it at your convenience.

I will then come back after two weeks to collect the questionnaire,

Please note that you have a right to withdraw from the study at any time.

I can be contacted as follows:

Cell.No:0723088000

E-mail: Motaung.steven@gmail.com

My supervisor is Prof SM Mtshali who is located at the School of Education, Turfloop campus of the University of Limpopo.

Contact details: sibusiso.mtshali@ul.ac.za Tel: 015-268 2388

Thank you for your contribution to this research.

APPENDIX H: BIOGRAPHICAL INFORMATION OF EDUCATORS FROM THE QUESTIONNAIRE

No.	Gender	Qualification/s	Experience	Life Sciences	Training	Teaching

			(YEARS)	periods per week. (HRS)	(YES/ NO)	other subjects
1	Male	STD	22	40	YES	YES
2	Male	PGCE	2	4	NO	YES
3	Female	STD, BA	32	12	NO	YES
4	Female	MASTERS	20	20	YES	YES
5	Male	BSC (HED)	11	20	NO	NO
6	Male	STD	18	24	YES	YES
7	Female	STD	31	40	NO	YES
8	Female	STD	13	16	NO	YES
9	Female	BED, (Hon)	27	8	NO	YES
10	Male	DIPLOMA CHEMICAL ENGEENERING	5	18	NO	YES
11	Female	DIPLOMA, BA, BA.HON.	33	26	NO	YES
12	Female	BSC	27	40	YES	NO
13	Female	STD	15	12	NO	YES
14	Female	BED HON.	13	42	NO	NO
15	Female	BED, BED HONs.	1	12	NO	NO
16	Female	BA	12	28	NO	YES
17	Female	BA, BED HONs.	37	16	NO	YES
18	Female	DIPLOMA	2	16	NO	YES
19	Female	DIPLOMA, PTD(SP), BA	19	30	NO	NO
20	Male	HDE	21	4	NO	YES
21	Male	DIPLOMA	32	4	YES	YES
22	Female	HED	20	18	NO	YES
23	Female	BED	1	13	NO	YES
24	Female	ACE-LS	20	10	NO	YES
25	Female	DIPLOMA, HONs.	14	8	NO	YES
26	Female	BED HONs.	7	24	YES	YES
27	Male	STD, BED HONs.	25	12	YES	NO
28	Female	ACE-TECHNOLOGY	18	24	NO	YES
29	Female	STD, FDE, ACE N. S	30	20	NO	YES
30	Male	FDE	20	41	YES	NO
31	Male	BED	2	12	NO	YES
32	Male	BED-LS	4	12	NO	YES

33	Female	BA, PGCE	6	20	NO	YES
34	Female	BED	1	5	NO	YES
35	Male	BA, STD	30	18	NO	YES
36	Male	HED	19	24	NO	YES
37	Male	BA	15	24	NO	YES
38	Male	HED	13	20	NO	YES
39	Female	STD	8	15	NO	YES
40	Male	FDE	19	20	NO	YES
41	Female	MUSIC	5	8	NO	YES
42	Female	MASTER	20	42	NO	YES
43	Male	BPed	24	38	NO	YES
44	Female	Bed. Hon	01	12	Yes	No
45	Male	PGCE	3	4	No	Yes

APPENDIX I: SUMMARY OF EDUCATOR'S RESPONSES TO THE QUESTIONNAIRES

Number	Frequency of practical examination	Type of practical examination	Method used	Learner involvement	Resources/ Improvising	Educator well being
1	Quarterly	Controlled hands on	Not available; borrow from neighbouring schools	none	none	Lacks confident
2	As required	Theoretical	Educator led discussion	Complete cookbook worksheet	Textbooks	Uneasy educator lacks experience
3	Quarterly	Selected practical's, per availability of equipment	Not available, improvise, e.g., instead of beaker they use transparent containers	yes	none	confident
4	As needed	Demonstration	Educator led	Answer questions	Textbook – no equipment	Tired –too many curricular changes from 1994 – it must stop
5	Weekly	Diagnostic test/hands - on	Available, Videos/project lessons, notes on smart board are also used	yes	Available	confident
6	Once a term	Demonstration	Educator cantered	Observation, write report	Get learners to find specimens in environment	Finds practical examination

						challenging .
7	Rarely	Theory replaces practical examination, e.g., Investigation s are used instead.	Not available,	yes	none	Lacks confidence
8	Sometimes	Demonstrati on	Educator cantered	Complete worksheet on demonstrati on	Use textbook stock in principal's office	In adequate, more training needed for different types of practical
9	Per term	Hands -on	Not Available, computer laboratory used for Internet/ online practical's	yes	none	Lacks confident
10	Depends on topic	Micrograph's dissections demonstratio n	Learner centred	Help with planning, getting materials, making simple apparatus for demonstrati on	Use photographs for micrographs, make simple apparatus e.g., bell jar experiment	Love teaching, needs more training in practical and practical examinatio n
11	Timeously	Hands –on safe activities	Not available;	yes	none	Lacks confidence
12	As Per CAPS	Demonstrati on	Educator driven	Complete worksheet	School has limited stock	Uncomfort able –

	requirement	worksheets				need more guidance for practical
13	As much as possible	Hands -on	Not available, Google is used instead	yes	Not enough	Lacks confident
14	As needed	Demonstration	Educator led	Answer questions based on demonstration	Use local specimens, make models	Overwhelmed by practical examination demands
15	Not much	experiments	Not available, University of Limpopo Science Lab is used	yes	none	Less confident
16	Twice a term	Hands on; minds on	Educator and learner centred	Complete worksheets	Textbook local specimen	I do not enjoy practical examination
17	Weekly / every chapter	Educator prefers all types	Not available but learners do field observations of organism/household substances /apparatus are used	yes	Old laboratory	confident
18	Twice per term	Worksheet demonstrations	Educator centred	Answer questions on demo	Make models – cell division. Use local plant parts	I need help with practical and practical examination. I am not ready for

						this
19	Once in a term	Hands on	Any practical is welcome as we have all resources	none	School has all resources	Not confident
20	Once a term	Worksheet's micrographs	Lead by an educator	Complete worksheet	Use photographs/ charts/ need equipment	I am ok, I can do the practical
21	Twice per quarter	Less dangerous activities/ experiments	Learner participation /learners get marks according to their responses	Fully	None	Give his attempts
22	Once a term	Theoretical	Educator led discussion	Complete written activity from textbook	Textbook; no resources	Incompetent – need help and training – for hypothesis graphs
23	Not very often	Learners Observing demonstration	None	done	No resources	Not confident
24	As needed	Demonstration worksheets	Educator led discussions	Worksheet activities	Whatever is available	I do not like the practical exams – if they want us to have practical exams then we must have resources and be trained

						properly this is the cart before the horse.
25	Seldom	Investigative experiments	Class demonstrations in groups	No involvement	None, educator improvise	Lacks confidence
26	Depends on the topic	Demonstrations	Educator led	Complete worksheet on concepts demonstrated	Local specimen Charts, models made by me	Partly confident but need training and help
27	Not done	Not done	Use of previous Exam question papers	Not involved	Not sufficient	Not sure about himself
28	Once a year	Worksheet	Educator led	Fill in the worksheet	Use local specimen	Uncertain – there is no uniformity/ so how do you judge for standards – our learners will always be disadvantaged.
29	Once a quarter	Hands on	Real practical	Doing of practical	Very few,	Need training
30	Not often	Theoretical	Educator led	Answer questions	textbook	I need help – training, I was not trained to do practical when I qualified
31	Every term	Inquiry	Shoestring	yes	None/often	Have

		based learning			borrowed from neighbouring schools	confidence
32	Not at all	Nil	Nil	Nil	Nil	Not trained to teach Life Sciences
33	Once a year	Demonstrati ons	Educator led	Answer questions	Textbooks and google	No trained
34	Twice per term	Micrograph / worksheet	Learner centred	They make charts/ models	Use local material	Unhappy- we are never asked about changes
35	Depending on the topics, randomly done/ never	Hands on	Demonstration	None	No resources	Lack confidence
36	To meet CAPS requiremen ts	Worksheet	Educator/ learner centred	Help in getting specimen from local area	Try to use local resources. Make models	Confident – did practical at the university. Need physical resources.
37	To meet CAPS requiremen t	Worksheet demonstratio n	Educator led	Complete worksheet	Use local specimen from surrounding	Sad- I am not confident doing the practical, I need to be trained to use some equipment

						– I want to learn
38	To meet CAPS requiremen ts	Demonstrati ons/ micrographs	educator centred	Use charts/ photos of microscopic structures	Textbooks/ charts	Confused – too many demands for practical examinatio n suddenly – no training
39	Once term	Demonstrati on	Educator centred	Answer questions	Local resources/ make models	Uneasy – I do not know what I will be expected to do when CAPS changes – too many changes too soon
40	Seldom	Theoretical	Educator led	Answer questions from textbook	Textbook – no equipment	Unhappy – I did not do practical even at college, we do not have the lab and we are not trained for practical, but we must do practical examinatio n
41	Nil	Nil	Nil	Nil	Kept by HOD	Not

						qualified to teach Life
42	Depends on the topic	Hands on/ worksheets/ demonstration	Educator/ learner centred	Write report/ complete worksheet/ draw or label	Local specimen/ make model/ borrow equipment	Confident _ I did practical at the university
43	Depends on the topic	Demonstrations/ theoretical	Educator led	Answer questions on textbook	Textbook	I am not confident – but to have this fancy practical examination we need basic resources – we cannot find it all – disadvantages school will not benefit if they are poor in resources
44	Rarely	Hands on practical	Educator and learner centred	Answer questions in the worksheet	The university of Limpopo lab is used	Fairly trained but still need more since working at under equipped school
45	Depend on availability of apparatus	Hands on/ demonstrations	Educator centred	Observations and recording in the worksheet	Textbook, worksheet but there is no laboratory	Not confident, lack equipment, crying for

						workshop

APPENDIX J: ROGAN AND GRAYSON'S PROFILE OF IMPLEMENTATION

Level	Person involved	Classroom interaction	Science Practical examination	The role of science in society	Examinations	Personal happiness
1	Educator	Well organised content	Concept developed through demonstrations	Everyday life examples used	Written tests	Educators feel pressurised, confused, challenged, and frustrated
		There is a lesson plan available.			Recall type questions	
		Effective usage of a textbook	Illustrate through specimen		Some higher order questions	
		Learners were enthralled by questions.			Marking is done properly	
	Learners	Attentively engaged	Observing	Stay attentive, and engaging	Rote learning mostly applied	
		Ask and respond to question	Asking and answering questions	They are asking and responding to questions	High order thinking	
2	Educator	Textbooks are used in conjunction with other materials.	Demonstrations are used to encourage people to ask questions.	Uses specific issues that the local community is dealing with.	In written tests, 50% of the questions necessitate higher-order thinking.	Educators have a solid sense of self-esteem and are secure in their abilities.
		Using questions to engage learners and			Questions based on practical activities	

		inspire deep thought				
	Learners	Extra resources used to compile own notes	Assisting to plan and perform demonstrations	Educators aid learners in exploring and explaining scientific phenomena from many cultures.	Applying practical knowledge	
		Engaging in meaningful group work	Participate in cookbook practical activities			
			Graphs and tables are used to communicate data.		Applying higher-order thinking	
			Pose and respond to questions			
3	Educator	Probe's learner's prior knowledge	Practical activities designed to promote learner's discovery of information	Facilitates investigations	Written tests	Educator is self-assured, gaining ground, motivated, and well-organized.
		Ensure structuring of learning activities is relevant, it requires problem-solving techniques			Guided discovery activities, both visible and unseen, are included in the tests.	
		Introduce evolving scientific knowledge to			Other techniques of assessment are used in addition to testing.	

		learners				
	Learners	Engaging minds-on activities	Performing practical examination that is guided discovery in small groups	Investigate science application in their own environment, actively	Putting theory into practice	
		Making their notes, based on the concepts learned from doing activities	Writing a scientific report		Using higher-order reasoning	
			Can justify conclusions regarding data collected			
4	Educator	Facilitating learners as they undertake and design a long-term investigation	Facilitates learners with design and data collection strategies	Facilitates learners with the community project and identifying the needs	Providing opportunities for a variety of assessments	Educator feels empowered, self-directed, and respected
		Assisting learners to weigh theories to explain certain phenomena	Facilitates learners on data interpretation and conclusions		Assisting with portfolio compilation	
	Learners	Takes major responsibility for own	Design and do their own	Undertake long term community-based	In the assessment, there is an open investigation of a community	

		learning	investigations	investigation	project.	
			Reflecting on project design and on data collected	Applying science to specific needs in their communities	Creating portfolio to present their best work	
			Data interpretation,			

(Samaneka 2013 and Rogan &Grayson 2003)

APPENDIX K: PROFILE OF CAPACITY TO INNOVATE.

Level	Physical resources	Educators	Learners	Environmental and management issues in schools
1	✓ Basic structures are available, although they are in bad condition. ✓ There are toilets and running water. ✓ There is electricity accessible. ✓ Not enough textbooks ✓ Basic equipment is available. ✓ There are no science laboratories available, or there are science laboratories available, but they are not in functioning order.	✓ Educator is unsuitable for the post. ✓ Educators do not have any formal qualifications. ✓ Educator absenteeism is low. ✓ Educators spend 50% of time teaching	✓ The language of instruction is well-understood by the learners. ✓ Some learners lack food at home. ✓ Schools have a feeding program. ✓ Learners face socioeconomic difficulties. ✓ Learners receive minimal support in their academic work at home.	✓ Timetable, and other routines available ✓ Principal is present at least 50% of the time. ✓ Staff and subject meeting held. ✓ Educators' attendances register available. ✓ Teaching and learning occur mostly. ✓ After the break, educators and learners return on time, and ✓ There is a school governing body. ✓ The school is secure

2	✓ A basic structure that is in good working order. ✓ Furniture that is appropriate ✓ There is electricity accessible. ✓ Textbooks are provided to all learners. ✓ enough scientific apparatus	✓ Educators are required to have a certain level of certification for their professions. ✓ Educators who are enthusiastic and hardworking. ✓ Participates in professional development activities as an educator. ✓ The educator has a positive relationship with the learners.	✓ Learners go to school on a regular basis. ✓ The learners are well fed. ✓ Learners are given activities to do. ✓ The educator has a positive relationship with the learners based on mutual respect.	✓ Educators go to school on a regular basis. ✓ The principal is present most of the time and communicates with the employees on a frequent basis. ✓ Implemented timetable in a correct manner. ✓ Extracurricular activities are planned so that they do not conflict with scheduled classes. ✓ Educators and learners who ignore their responsibilities will be held accountable. ✓ Educators, managers, and learners all share responsibility for keeping the school running well. ✓ SGB runs smoothly. ✓ School is always in operation.

3	✓ Building enough classrooms and science facilities is a good idea. ✓ All rooms have running water and electricity. ✓ All learners and educators will benefit from this textbook. ✓ Sufficient scientific equipment ✓ Educators will benefit from additional subject reference books. ✓ a library that is well-equipped ✓ a safe environment ✓ Grounds that are well-kept	✓ Educator is qualified for the position and is well-versed in the subject. ✓ Educator participates in professional development programs on a regular basis. ✓ Educator's punctual attendance in class ✓ Educator goes above and beyond to improve teaching	✓ Learners have access to a secure learning environment. ✓ Learners come from families that are supportive of them. ✓ Learners have the financial means to purchase additional books and fees. ✓ Parents are concerned about their children's progress. ✓ Information Technology is available to learners.	✓ During school hours, the principal assumes a strong leadership role and is visible. ✓ Educators and learners play an active role in school administration. ✓ Everyone at the school is dedicated to making it a success. ✓ Parents are involved in the SGB in a big way.

4	✓ Excellent structures ✓ There is more than one well-equipped lab and a well-stocked library. ✓ a sufficient supply of curricular materials and other textbooks ✓ Resources for teaching and learning that are of high quality. ✓ Grounds that are well kept ✓ Exceptional copying capabilities	✓ Educator is overqualified for the position and has a strong grasp of the material. ✓ Educator is a person who is passionate about teaching. ✓ Educator demonstrates an openness to change, improvement, and collaboration. ✓ Educator takes a leadership role in professional development initiatives on a local and worldwide level.	✓ Learners take charge of their own education. ✓ Learners are open to trying different approaches to learning.	✓ There is a common goal. ✓ Change is planned for, supported, and monitored at school. ✓ All stakeholders must work together. ✓ At school, there is visionary leadership.

(Samaneka 2013 and Rogan &Grayson 2003)