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**EXPERIENCES OF GRADE 6 EDUCATORS IN TEACHING NATURAL SCIENCE
AND TECHNOLOGY THROUGH ENGLISH IN REKOPANTSWE CIRCUIT**

by

FULL NAMES AND SURNAME

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submitted in accordance with the requirements for
the degree of

MASTER OF EDUCATION

in the subject

EDUCATIONAL MANAGEMENT

in the

COLLEGE OF EDUCATION

at the

UNIVERSITY OF SOUTH AFRICA

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YEAR OF COMPLETION: 2026

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EXPERIENCES OF GRADE 6 EDUCATORS IN TEACHING NATURAL SCIENCE AND TECHNOLOGY THROUGH ENGLISH IN REKOPANTSWE CIRCUIT IN BOJANALA DISTRICT.

I, Johannes Vusi Mnisi, declare that the above dissertation is my own work and that all sources used or quoted have been properly indicated and acknowledged through complete references.

I further declare that I have not previously submitted this work, or part of it, for examination at UNISA for another qualification or at any other higher education institution.



SIGNATURE

February 2026

DATE

ACKNOWLEDGEMENTS

I would like to begin by expressing my deepest gratitude to the Almighty for granting me strength, wisdom, and perseverance throughout the course of this research.

My heartfelt appreciation goes to my wife, Portia Mnisi, whose unwavering support, encouragement, and understanding sustained me during this journey.

I am profoundly thankful to my supervisors at UNISA, Dr. PON Moshaba and Dr, MV Kgabo, for their invaluable guidance, constructive feedback, and mentorship, which greatly enriched the quality of this study.

Special thanks are extended to the NS-TECH educators at Rekopantswe Circuit, whose cooperation and dedication made this research possible.

I also wish to acknowledge Mr Maswanganyi, the NS-TECH Subject Advisor, for his encouragement and support, whose inputs and assistance were helpful in shaping the direction of this work.

To all who contributed in different ways both, great and small, I remain sincerely grateful.

ABSTRACT

The teaching of NS-TECH in English as a second language within the Rekopantswe Circuit of Bojanala District exposes the complexity between language competency and the comprehension of subject concepts, placing grade 6 educators' experiences as important evidence of the challenges, shaping multilingual education in South Africa.

This study explored the experiences of Grade 6 educators teaching Natural Sciences and Technology (NS-TECH) through English as a second language (ESL) in the Rekopantswe Circuit, located in the Bojanala District of the North-West province, South Africa. Guided by Vygotsky's sociocultural theory, which emphasises the role of social interaction and cultural context in learning, the study investigated how language influences the teaching and learning of NS-TECH in multilingual environments.

A qualitative research design was employed. Data were collected from four sampled primary schools through semi -structured interviews, classroom observations and document analysis involving eight Grade 6 NS-TECH educators. The findings reveal that educators frequently experience difficulties in ensuring learners' understanding of scientific concepts due to limited English proficiency. According to Nomlala and Makena (2025), these challenges are intensified by the broader realities of rural schooling, including limited resources, inadequate infrastructure, overcrowded classrooms, and low levels of parental support. In many cases, parents' low socio-economic status restricts their ability to provide reading materials or academic support at home.

The study supports that language is an important factor in shaping NS-TECH learning, and that it is context sensitive, in which strategies are essential for promoting NS-TECH education in multilingual classrooms.

Key words

Code-switching

English as a Second Language (ESL);

multilingual classrooms

Natural Sciences and Technology (NS-TECH)

Sociocultural theory

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ACRONYMS AND ABBREVIATIONS

CAPS	Curriculum Assessment Policy Statement
DDD	District Data Driven
EMI	English as the language of teaching and learning
ESL	English as second language
FP	Foundation Phase
ICT	Information and Communications Technology
LiEP	Language-in-Education Policy
LoLT	Language of learning and teaching
LTSM	Learning, Teaching and Support Materials
MOI	Medium of Instruction
NCS	National Curriculum Statement
PLC	Professional Learning Committee
SASA	South African Schools Act
SDG	Sustainable Development Goals
SMT	School Management Teams
STEM	Science, Technology, Engineering and Mathematics
UNISA	University of South Africa
ZPD	Zone of proximal development

CHAPTER 1: INTRODUCTION AND BACKGROUND OF THE STUDY.

1.1 INTRODUCTION

Ammari (2022) asserts that, within academic settings, teaching any subject is an integral component of educators' roles, requiring them to motivate and actively engage learners to nurture a conducive learning environment. This is also confirmed by Shubani and Mavuru (2022), who emphasized the importance of language skills during the teaching and learning process. There is a direct link between English proficiency and performance in science subjects. Shubani and Mavuru (2022) argue that limited language ability hinders learners' ability to understand abstract scientific concepts, thereby restricting their participation in discussions and assessments.

While the challenges of teaching science in primary schools through English as a second language (ESL) are significant, they also present opportunities for creativity and improvement in educational practices (Daud, 2024). By adopting effective pedagogical strategies and addressing policy as well as resource-related issues, educators can enhance the learning experience for learners. Furthermore, the global demand for English proficiency undermines the importance of overcoming these challenges to prepare learners for a globalised world. Montgomery (2023), states that the use of English to teach science subjects is now becoming popular in worldwide classrooms, with an increasing number of ESL learners learning science in English as the language of teaching and learning, the medium of instruction (MOI). Therefore, several challenges like lack of verbal participation by learners and comprehension of scientific concepts are encountered in the teaching and learning of Natural Sciences and Technology content (NS-TECH) as a subject, through English as MOI to the second language speakers of English.

Lulwani (2023) stated that the major goals of NS-TECH education in the global context include promoting a Science, Technology, Engineering and Mathematics (STEM) literate workforce, capable of addressing worldwide challenges, promoting sustainable development, and ensuring equitable educational opportunities. These goals align with the Sustainable Development Goals (SDGs), and aim to end poverty, protect the planet's health, and enhance the quality of life for all. By integrating STEM disciplines, education seeks to equip individuals with the skills necessary for prosperous and fulfilling lives by 2030.

The STEM disciplines comprise Science, Technology, Engineering, and Mathematics, each contributing uniquely to an integrated body of knowledge. Science involves the study of the natural world through observation and experimentation, encompassing subjects such as biology, chemistry, and physics, and promoting inquiry, investigation, and critical thinking skills. Technology focuses on the use of tools, systems, and digital resources to solve problems and enhance learning, including computing, information systems, and the application of digital competencies. Engineering centres on the design, construction, and improvement of structures, machines, and systems, emphasising creativity, problem-solving, and the application of scientific and mathematical knowledge to real-world challenges. Mathematics, as the study of numbers, patterns, relationships, and logical reasoning, provides the foundational language and analytical tools that underpin and connect all other STEM disciplines.

Montgomery (2023) cites that the use of English to teach science subjects is becoming increasingly common in worldwide classrooms with an increasing number of ESL learners learning science in English. Consequently, there are a number of challenges in teaching the content of NS-TECH as a subject, through English as the medium of instruction to the Grade 6 ESL speakers.

Teaching science to learners who speak multiple languages is a challenge in many nations. For instance, research conducted in the United States by Buxton and Lee (2023) has revealed that learners who are learning English struggle in scientific classes where English is the primary medium of instruction. Similar studies on teaching science to foreign learners who do not speak the language of instruction have been conducted in European nations such as Germany (Feser and Haagen-Schützenhöfer, 2023). It is confirmed that monolingual learners benefited more from the teaching and learning process than multilingual learners learning through a foreign language, according to (Feser and Haagen-Schützenhöfer, 2023).

There has been much discussion on the medium of instruction in science education in multilingual African contexts. Learners instructed in their native languages demonstrated higher performance than those taught through foreign languages in primary science education, according to experiments conducted in Tanzania and Kenya (Brock-Utne, 2023). People are becoming more aware of the fact that

employing their native languages can aid in the comprehension of scientific ideas (Buxton, 2023).

1.2 RATIONALE FOR THE STUDY

Teaching Natural Sciences and Technology (NS-TECH) to primary school learners presents unique challenges, especially when the language of instruction is not the learners' first language. Majority of learners in the North-West Province, Rekopantswe Circuit acquire education through ESL. Sixth-grade educators have to navigate the difficulties of teaching the content, while overcoming language barriers that may prevent learners from learning and understanding the content effectively. These obstacles are made worse by learners' poor English ability, which makes it harder for them to comprehend subtopics and fully engage (Akram, Ahmad & Aslam, 2020).

Linguistic proficiency is very important for the teaching and learning of content subjects with a lot of material, such as NS-TECH (Kutame and Mphahlele, 2023). This study is motivated by the high degree of incompetence in NS-TECH, among sixth-grade learners. The study will make it possible for the Education Sector's stakeholders to pinpoint the difficulties that may arise from using English, second language as the language of teaching and learning. According to Kincioğlu (2023), English as the medium of instruction (EMI) is the use of English, sole use, partial use, codeswitching, by both content educators and learners to learn the academic subjects, apart from English itself as a subject, in EMI settings, anywhere in the world.

Teaching Grade 6 non-native English speakers, NS-TECH in English presents several challenges. Learners may find it difficult to understand complex scientific concepts when instructed in a language they are not fully proficient in, which could lead to misconceptions and confusion (Kumanda, Chiphambo & Mtisi 2022).

Carlsson, Esteves and Jeandin (2024) note that non-native English speakers may struggle with scientific vocabulary when they are required to learn the language and subject content at the same time. Learners may become overwhelmed, which will affect their memory and ability to apply the knowledge. Additionally, if the foreign language does not always align with their cultural backgrounds, they may find it more difficult to relate to scientific concepts and examples (Pirtheepal, 2019).

The purpose of this study is to develop and apply a comprehensive framework to identify the challenges educators face when teaching Grade 6 NS-TECH through ESL in the Rekopantswe Circuit, Bojanala District, Northwest Province. The study is also sought to determine and identify the difficulties in teaching the Grade 6 learners in English, who are not native English speakers.

The following table indicates the pass rates of Mathematics and NS-TECH, which are taught in English as part of the MOI. (DDD, 2025)

Table 1.1: Grade 6 Pass Rates in Rekopantswe Circuit

	Total number of learners in Grade 6	Mathematics Pass %	Number of learners not passing Mathematics	NS-TECH Pass %	Number of learners not passing NS-TECH
2023	1201	78%	144	73%	324
2024	1304	68%	417	76%	312
2025	1284	64%	462	74%	333
Total in three years			1023		969

Source: (DDD, 2025)

Another reason for the study emanated from the subject examination pass rate performance of NS-TECH learners in the Rekopantswe Circuit, as indicated in Table 1.1. The performances of NS-TECH over a period of three years in the Rekopantswe Circuit, indicate that there is a significant number of learners who did not meet the pass requirements of NS-TECH.

Furthermore, Pearson (2026), has observed challenges internationally in multilingual education systems and has stressed that inquiry-based Science teaching is the most effective method, unlike learners, who are faced with English as an additional language and have to deal with words such as *describe, explain, and compare, which* often create barriers unless taught consistently and in accordance with the context.

Journals such as RSELTL (2026) emphasize that rigid English-only policies limit learner participation, while flexible multilingual approaches, supported by

technological tools and translanguaging, improve the outcomes in the Science subjects. In South Africa, the teaching of Science through English remains a challenge. Research has indicated that many learners struggle to comprehend the scientific concepts when the content is delivered through English only, particularly in the contexts where home languages such as isiXhosa, Setswana, or isiZulu dominate. Educators often resort to code-switching. The study by (Kumanda, Chiphambo & Mtsi, 2022) reveals that teachers feel excluded from curriculum development processes, and learners face difficulties with scientific concepts. Mother Tongue-Based Bilingual Education (MTbBE) emphasizes the need for early Science teaching in indigenous languages, supported by a gradual transition to English. This supports the importance of investigating the Experiences of grade 6 educators in teaching NS-TECH in English as per the policy, and what is happening during the classroom teaching and learning

1.3 RESEARCH PROBLEM

Aityan (2022), mentions that a research problem is a specific question or issue that is unknown or unavailable, which the research aims to address. It is crucial to select and develop the problem carefully, ensuring that it is clearly, accurately, and unambiguously stated. A well-defined research problem simplifies the research process and enhances the likelihood of finding a solution. When English is employed as a MOI to teach topic areas to foreign language speakers, it provides difficulties for both educators and learners, according to Lasagabaster (2024). Wilson and Mavuru (2023) argue that using English as the medium of instruction, which is unfamiliar to many South African learners, negatively affects the teaching and learning of scientific concepts, as many primary school learners lack the reading and comprehension skills needed to understand the content.

Warren and Bell (2022) highlighted that the current state of science education for South African primary school learners, face significant challenges, as they are taught through English second language. Educators often resort to code-switching between English and Setswana to assist comprehension of difficult scientific concepts. Many learners struggle with English as the language of instruction, which hinders their understanding and performance. Additionally, educators report a lack of involvement

in curriculum planning and insufficient training, highlighting the need for professional development and the adoption of a mother-tongue policy for effective teaching.

In addition to the above listed challenges, the socioeconomic factors, poor school infrastructure and the lack of science teaching equipment, all impact negatively towards the mastery of the scientific concepts and knowledge, amongst the primary school learners.

1.4 SIGNIFICANCE OF THE STUDY

Hiebert, Cai, Hwang, Morris & Hohensee (2023) states that the significance of a study refers to the importance of the research problem, questions, and hypotheses in improving learning opportunities or addressing widely shared long-term goals. It is not predetermined or self-evident; rather, it is developed through a coherent theoretical framework that connects the study to existing research. The importance of this study can best be explained from the personal point of view of the current researcher. As an educator at a primary school, the researcher has identified challenges in teaching NS-TECH Grade 6, through English as MOI to learners in Rekopantswe Circuit, who are not native English speakers. The study would also advise educators on methods of teaching NS-TECH content through English more effectively. The findings would even inform educational policy makers, contributing to the development of more effective language and curriculum policies that cater to diverse linguistic backgrounds.

The researcher strongly believed that the study would find out how we can improve the teaching strategies of NS-TECH, which is taught through English as a second language. Ultimately, that could boost learners' NS-TECH academic performance, preparing them for future academic pursuits and careers in the Science, Technology, and Engineering fields.

1.5 PRELIMINARY LITERATURE REVIEW

This section reviewed literature related to the difficulties encountered by educators in teaching through English in a context where learners are not English language speakers. The section further explored the effective pedagogical approaches and tools to support non-native English-speaking learners and educators in NS-TECH lessons conducted through the English language. The study also reviewed how educators

understand and implement the integration of Science and Technology in teaching. Motloun, Mavuru & McNaught (2021) note that township and rural schools in South Africa are culturally and linguistically diverse, requiring educators to ensure understanding of scientific concepts while taking learners' different backgrounds, cultures, and languages into cognisance.

According to Kamanda, Chiphambo & Mtsi (2022), the literature on teaching Natural Sciences and Technology (NS-TECH), through English as a Second Language (ESL) in South Africa, reveals significant insights into the challenges and strategies involved. Shykun (2023) confirms that integrating subject content with a second language as the medium of instruction is complex, especially for primary school learners who must learn both the content and the language simultaneously. (Caingcoy, 2023) has underscored the importance of culturally responsive teaching practices and the need for targeted professional development that supports educators in this dual task of teaching the content and integrating the second language as the medium of instruction. The literature has identified several effective strategies to enhance comprehension and engagement in educational settings, including the use of visual aids, simplifying language, and promoting collaborative learning environments. These strategies are crucial for improving reading comprehension, facilitating language acquisition, and supporting interdisciplinary learning. The integration of these methods can lead to improved educational outcomes by catering to the different learning methods and needs (Galimpin, 2024). Curriculum frameworks such as the Curriculum Assessment Policy Statement (CAPS) shape teaching and assessment in South Africa. It highlights the need to align policy with classroom realities to support inclusive and effective learning.

Mastering English is now seen as a component of scientific literacy since it has emerged as the universal language of science (Meyerhoffer and Dreesmann, 2019). As a result, learners must become acquainted with the language early in their education. English is the language that facilitates communication during the teaching and learning process in South Africa. Therefore, the fundamental abilities and subject-matter knowledge will not be meaningfully taught without the efficient application of EMI (Namuchwa, 2022).

I agree with the statement because the language of instruction is crucial in promoting the acquisition of subject matter in any teaching and learning environment, including NS-TECH subject, to improve successful teaching and learning, both educators and learners must use the language of instruction effectively. From another perspective, disagreements about the medium of instruction employed during the early learning stages may have a detrimental impact on learners' later phases of educational development.

South Africa's multilingualism led to a policy that designated Afrikaans and English as the media of instruction (MOI) for the whole country's educational system, from grade 4 to 12, regardless of the 11 distinct official languages enshrined in the South African Constitution. As a researcher and educator, I believe that effective science education in primary school is essential because it builds the foundation for scientific literacy and helps learners understand the world around them. This form of literacy equips learners to make informed decisions and actively engage with scientific issues in society (Deehan, MacDonald & Morris, 2022).

For this reason, the study seeks to reduce barriers such as limited understanding of English as the medium of instruction (Vaughn and De Beer, 2020). Many educators use unstimulating teaching approaches because learners have low reading skills and limited English proficiency. Unstimulating teaching makes it difficult to engage learners in practical science activities that support deeper understanding and inquiry skills. The classroom environments like in Rekopantswe Circuit, where the researcher conducted this study, are somehow impoverished for science teaching and learning due to minimum group discussion and communication through English as MOI.

Given the English language difficulties, teaching and learning in South African township and rural schools' need attention, because it hardly complies with the CAPS. (Vaughn & De Beer, 2020), engaging teaching strategies are required to be drawn in and motivate primary school learners to pursue science education in secondary schools and beyond. Rashov (2024) states that subject learning requires appropriate materials to support teaching and learning. In South Africa, NS-TECH Learning and Teaching Support Materials (LTSM) are limited, as they are not available in learners' home languages. Current textbooks are provided only in English and Afrikaans. This motivated the study to examine the availability of suitable materials for non-English

speakers and appropriate teaching methods when using English as the language of teaching and learning.

1.6 THEORETICAL FRAMEWORK

Nardo (2021) explains that a theoretical framework links a study to the broader body of knowledge, helps explain why phenomena occur, and provides context for research findings. It ensures that the study is grounded in existing theory and contributes meaningfully to the field. A theoretical framework also offers a clear and systematic explanation of the relationships among key concepts, theories, and ideas related to the research problem. It helps researchers to identify key variables, clarify definitions, and establish a basis for interpreting findings. Essentially, it serves as a blueprint for the research design and analysis, grounding the study in a specific theoretical perspective or paradigm.

In this study, of the title, “Experiences of Grade 6 educators in teaching Natural Science and Technology through English as in Rekopantswe Circuit”, a consideration was made towards the use of sociocultural theory by Vygotsky (1929–1934). The theory is based on the importance of social interactions and cultural context in learning and development, which is highly relevant when teaching in a second language like English to learners who come from multilingual and multicultural backgrounds like Rekopantswe Circuit.

The sociocultural theory is the backbone of any proposal in the context of education and consists of the following key elements, the zone of proximal development (ZPD), which is a concept developed by Lev Vygotsky within the field of Educational Psychology, referring to the range of tasks that a learner is not yet able to perform independently but can accomplish with guidance, support, or collaboration from a more knowledgeable other, such as an educator, peer, or adult. Fundamentally, the ZPD represents the space between what a learner can do on their own and what they can achieve with assistance. Effective teaching in English, therefore, occurs when educators provide appropriate and intentional support within this zone, thereby facilitating learning and promoting cognitive development. mediation, social interaction and cultural tools (Yousef and Mahameed, 2022).

Based on the reviewed literature, sociocultural theory is appropriate for this study because it considers the role of language and cultural context in the Rekopantswe Circuit, where Grade 6 learners are taught in ESL while speaking different home languages. Languages like Setswana, isiNdebele, Xitsonga and Sepedi. It has been confirmed by Nomnian (2020), that language forms part of any community culture. The core elements are further explained and unpacked in the following paragraphs.

1.6.1 The Zone of Proximal Development

Yousef and Mahameed (2022) describe the ZPD as involving scaffolding techniques that examine how educators support learners who are learning scientific concepts through a second language. In this study the focus was on English as the second language for learners in Rekopantswe Circuit. The ZPD also deals with specific strategies to be used for learners to understand and engage with the content. In this case, the content was NS-TECH related. The scaffolding technique is relevant for the study at hand, as it involves educators who are expected to provide support and guidance to learners in scientific investigations. Peer Interaction in the ZPD element involves how learners interact with each other during the learning process and how they support each other within their ZPDs. It also ensures that there are collaborative activities to help to bridge language gaps amongst learners through peer interaction approach (Yousef and Mahameed, 20 22). The ZPD is a valuable theoretical framework, and it was chosen as a framework due to its relevance for this study. The ZPD focuses on what a learner can do without any help and what the learner can do under the educator's guidance. It allows the educator to tailor their teaching methods according to the learners' potential level and making teaching and learning more effective (Eun, 2020).

The ZPD also consist of a relevant element referred to as scaffolding, which allows educators to temporarily support learners, as they learn new concepts (Puntambekar, 2022). This is crucial and useful for non-English speakers, who may need additional support towards the understanding of scientific concepts in English. The ZPD concepts support collaborative learning in which peers share knowledge amongst themselves (Zhang, 2023). Collaboration amongst learners will benefit non-English speakers by speaking to each other as peers, through the support of the educator. A collaborative

environment facilitates the exchange of ideas, through which less advanced learners in scientific concepts will benefit from the advanced learners.

Based on the broad definition of the ZPD, the study applied this concept to support the creation of a more inclusive and effective learning environment for learners learning NS-TECH through ESL.

The Sociocultural Theory by Vygotsky is not just background; it frames the central challenge of teaching Natural Science and Technology (NS-TECH) through English as a second language. The theory positions language as both a tool of learning and a barrier when English is used as the MOI. The theory informs the research problem on how educators could mediate the knowledge when learners' home language differs from the language of Instruction. The Sociocultural Theory shapes the research questions on how educators scaffold learners' understanding of NS-TECH concepts through ZPD. The Data collection methods that were used are the Interviews, which probed teachers' scaffolding strategies (ZPD). Classroom observations captured mediation practices in real time. Document analysis revealed the cultural tools teachers rely on daily basis. Thus, the theory directly informs the research problem, how educators mediate scientific knowledge when learners' linguistic resources differ from the language of instruction.

1.6.2 Mediation

Mediation is another element of sociocultural theory, which will be explored in the study. The mediation process involves language as a tool, through which it explores the teaching approach used by educators to mediate learning, particularly when using English as the language of learning and teaching (LoLT). This included the use of visual aids, gestures, and simplified language to make scientific content accessible to learners. The use of technological tools to examine how technology, for example, educational apps, online resources, assisted in teaching and learning processes of NS-TECH, particularly to overcome the language barriers (Tuzovic & Kabadayi, 2021).

1.6.3 Social Interaction

Social interaction involved educator-learner dynamics, where there were analyses of the interactions between educators and learners. It has to do with relationships and creation of an inclusive classroom environment that supports second language learners. Classroom discourse is another key element explored, focusing on the patterns of classroom talk.

Educators should be able to facilitate discussions that encourage scientific thinking and language development simultaneously (Han, 2021). The statement was confirmed through the semi structured interviews and observations conducted with the sampled educators at Rekopantswe Circuit.

1.6.4 Cultural Tools

In this element, the researcher looked at the integration of NS-TECH content with the local environment as planned by educators, to make the content more understandable and relatable to learners. This was done through the integration of local contexts. Availability and the use of bilingual resources were also considered to bridge the language gap. By focusing on these aspects above, the researcher was able to thoroughly examine the experiences and strategies of Grade 6 educators teaching Natural Science and Technology through ESL in Rekopantswe Circuit. Moubpua and Atobatele (2024) highlighted the importance of multilingual approaches in Science and Technology education, specifically in contexts where learners face language barriers. The researchers argued that the integration of bilingual resources and cultural tools, such as local examples, familiar contexts, and learners' home language, helps to bridge the gap between scientific concepts and learners lived experiences. When Science content is taught alongside language scaffolding, learners develop both literacy and linguistic competence.

This approach has provided a comprehensive understanding of the sociocultural dynamics that prevail in that area and the practical implications for improving educational practices in multilingual contexts.

1.7 DEFINITIONS OF KEY CONCEPTS

- **Intermediate Phase:** The skills, knowledge and competencies, which runs from Grade 4 to Grade 6. Learners are exposed to an increasingly difficult curriculum throughout this period, which focuses on improving their reading, mathematics, and problem-solving abilities. (Department of Basic Education [DBE], 2011).
- **LoLT:** Mphahlele, Manyaka & Moshaba (2022) state that the LoLT refers to the language used for instruction in schools. The South African Language-in-Education Policy (LiEP) advocates for the use of African languages as LoLT. However, challenges arise in implementing this policy, as many teaching materials are available only in English, creating a disjuncture between policy and practice.
- **Medium of Instruction (MOI):** According to Ngubane (2022), the MOI in South African schools refers to the language used to teach learners in educational institutions.
- **Natural Science and Technology (NS-TECH):** Science is a systematic technique to solving problems and connecting our ideas, according to the CAPS document (DBE, 2011). Certain methods of inquiry and study are usually used in the scientific domain. Replication and a systematic, impartial approach to scientific research are both possible with these methods. Techniques include creation of hypotheses and execution of experiments to test them. Numerous studies are carried out, and they are carefully examined and discussed before the methods and results are accepted as valid.
- **National Department of Education District Dashboard Data (DDD):** The South African National Department of Education District Dashboard Data (DDD) is a comprehensive data system designed to enhance the understanding and management of the education system in South Africa. The DDD is instrumental in tracking student progression, repetition, and dropout rates, and it offers a detailed view of the educational landscape through data visualisation tools (Makarov, 2023).
- **The ZPD:** The ZPD is defined as the gap between a learner's ability to work alone in solving problems and the ability of being able to work under the guidance of adults and knowledgeable peers, (Tamburlini, 2022). Vygotsky's theory posits that learning precedes development, and the ZPD is a space where this learning can

be scaffolded by social interaction and cultural tools, such as language (Tamburlini, 2022).

- **CAPS:** The Curriculum and Assessment Policy Statement (CAPS) is a significant educational reform in South Africa, designed to streamline and enhance the National Curriculum Statement (NCS) (Sepadi & Malapo, 2024). Introduced in 2011, CAPS aims to provide a clear and concise framework for what learners should learn, focusing on curriculum content rather than teaching methods.

1.8 RESEARCH QUESTIONS

The following main and sub-questions guided the study.

1.8.1. Main Question

What are the experiences of Grade 6 educators in the teaching and learning of Natural Science and Technology (NS-TECH), through the English medium in Rekopantswe Circuit?

1.8.2 Sub-Questions

- What challenges do Grade 6 educators face when teaching Natural Sciences and Technology (NS-TECH) through the English medium?
- How does the use of EMI impact the teaching strategies employed by Grade 6 educators?
- What are the perceptions of Grade 6 educators regarding learners' understanding and engagement in Natural Sciences and Technology (NS-TECH) taught through English?
- What support do Grade 6 educators receive from school management and district officials to address language-related challenges in teaching Natural Sciences and Technology (NS-TECH)?
- What strategies do Grade 6 educators use to overcome language barriers in teaching Natural Sciences and Technology (NS-TECH)?

1.9 AIMS AND OBJECTIVES OF THE STUDY

1.9.1 Aims of the Study

The main aim of the study is to explore, to further understand the experiences of Grade 6 educators in the teaching and learning of Natural Science and Technology (NS-TECH) through the English medium of instruction at Rekopantswe Circuit in Moretele District.

1.9.2 Objectives of the Study

- To establish the effects of teaching NS-TECH through ESL, as a MOI.
- To identify the challenges encountered by educators in teaching NS-TECH Grade 6, through ESL.
- To establish the ways of how learners, learn, when taught NS-TECH in ESL.
- To develop strategies to improve the teaching of NS-TECH Grade 6 in ESL.
- To establish ways on how the district officials and school management could support the NS-TECH Grade 6 educators, in their teaching through ESL.

1.10 RESEARCH METHODOLOGY AND DESIGN

Research technique, according to Verma (2024), is a methodical and scientific approach to resolve research issues. It is necessary for a researcher to create their methodology, which means that they must apply it in addition to knowing how to do it. Each challenge may require a different approach.

Research design, according to (Hunziker & Blankenagel, 2024), is a general phrase for a thorough examination of a small, non-random sample. This design has an in-depth emphasis. This feature sets case study research apart from other types of research methods that view each case as a comparatively unimportant and interchangeable component of a sample. This section has provided a thorough explanation of the methodology that was used in the investigation.

This study adopted the interpretivist paradigm, which seeks to understand people's meanings and experiences within their social context (Pervin & Mokhtar, 2022) and emphasises their participation in social and cultural life. Interpretivism is relevant in the sense that the school is regarded as a social context and environment, including

the home language as part of community culture. As Interpretivism is subjective in nature (Pervin & Mokhtar, 2022), it was then interpreted together with the findings of the study and the perspectives of the participants.

A qualitative research method was followed through the semi structured interviews, observations, and document analysis, with the sampled educators of Grade 6 NS-TECH. Through the implementation of the interpretivist paradigm, the study gained a body of knowledge regarding experiences and challenges faced by non-English Grade 6 learners and educators of NS-TECH.

1.10.1 Research Paradigm

According to Pretorius (2024), research paradigms are foundational frameworks that guide the philosophical and methodological approaches in scientific inquiry. They encompass a set of beliefs and practices that define how research is conducted, interpreted, and validated.

Key characteristics of research paradigms include their philosophical underpinnings, methodological approaches, and the role they play in shaping research questions and outcomes. These paradigms are essential for ensuring that research is methodologically sound, ethically robust, and socially impactful. The research paradigms have different characteristics, being ontology, epistemology, and axiology.

- **Epistemology:** This involves the nature and scope of knowledge. Positivism emphasises empirical evidence and objective knowledge, whereas interpretivism focuses on understanding the meanings people attach to their experiences (Mann, 2022). In relation to the study titled *Experiences of Grade 6 Educators in Teaching Natural Science and Technology through English*, epistemology concerns how knowledge about educators' experiences is generated and understood. This study is aligned with an interpretivist epistemological stance, which prioritises understanding the meanings that Grade 6 educators attach to their experiences of teaching Natural Science and Technology through the English medium. Rather than relying on objective measurement alone, the study seeks to generate knowledge through educators' perspectives, reflections, and interpretations of their classroom practices. In this way, knowledge is viewed as contextual, subjective, and co-constructed through interaction between the researcher and participants,

enabling a deeper understanding of the complexities involved in teaching and learning through a second language (Mann, 2022).

1.10.2 Research Approach

The qualitative research approach, in the form of a multiple case study in the Rekopantswe circuit has been employed in the study. According to Miles (2020), any research that uses data, that does not have numbers is referred to as qualitative. Thus, interpreting words and observations more than focussing on numbers, is the characteristics of qualitative research. It is further explained by Ryan and Bernard (2022) that a range of sources, such as audio, observations, pictures, and text, can produce qualitative data. This study used a qualitative approach to gather data on the teaching and learning of NS-TECH through English at four primary schools in the Rekopantswe Circuit, using semi structured interviews, observations, and document analysis. The qualitative research approach was suitable for this study since it analysed educator experiences in relation to NS-TECH instruction using ESL.

1.10.3 Population and Sampling

The population in a study is the full set of people or items that have the characteristics of interest to the researcher is the group from which the researcher wants to draw conclusions, Musthofa & Darmawan (2024). Sampling is the process of choosing a subset of the population to take part in the study. Sampling is necessary because learning the entire population is often not feasible. Sampling allows researchers to make inferences about the population based on the sample (Turner, 2020).

The population that was targeted in this study were all educators of Grade 6 NS-TECH, teaching at 15 primary schools in Bojanala District, Rekopantswe Circuit.

The study employed purposive sampling technique. Purposive sampling involves selecting individuals or cases that are particularly informative or relevant to the research question. This method is often used when researchers have a clear understanding of the characteristics that are important for their study (Nyimbili & Nyimbili, 2024). The sample comprised eight Grade 6 NS-TECH educators, from four primary schools in Bojanala District, Rekopantswe Circuit.

1.10.4 Data Collection Techniques

Data collection techniques are defined as the process of gathering and measuring information on targeted variables in an established system, which allows researchers to answer relevant questions and evaluate outcomes (Boyle, 2022).

This study involved qualitative data collection techniques and focused on human behaviour and social trends. The data collection techniques employed in the study were interviews, observation and document analysis.

- **Interviews:** This method provided deep insights into participants' perspectives and experiences. The method allowed for the exploration of complex issues (Kholifah & Sofwan, 2024).
- **Observations:** This technique offers a contextual understanding of the research environment (Kholifah & Sofwan, 2024). In the study, the school environments were used, particularly the classroom environments, where the observation was done. The classroom interaction at the four sampled schools were observed.
- **Document analysis:** This method involves analyses of existing documents and require critical evaluation to ensure accuracy and relevance (Morgan, 2022).

1.10.5 Data Analysis

Data analysis is the most crucial stage of research studies, serving as the bridge between raw data and meaningful insights. It involves a series of systematic processes that transform collected data into a format that can be interpreted to answer research questions, test hypotheses, and support decision-making (Kordel & Gruber, 2024). Qualitative analysis, is used in this study and focuses on understanding the meanings and experiences of participants (Kordel & Gruber, 2024)

Data collected through interviews, observation and document analysis was analysed immediately after being collected. Thematic analysis was used in this study to analyse the collected data to make it meaningful. Thematic analysis is particularly popular in qualitative research due to its flexibility and accessibility, making it suitable for a wide range of disciplines and research questions (Weckesser & Denny, 2022).

1.11 TRUSTWORTHINESS

Trustworthiness in a study refers to the degree of confidence that the findings of the study are accurate, reliable, and applicable. It is a critical aspect that involves both qualitative and quantitative research, ensuring that the results are credible and can be trusted by the academic community and beyond (Ahmed, 2024). The notion of Trustworthiness was maintained in the study by sampling educators who are qualified and experienced in teaching NS-TECH in grade 6. The trustworthiness concept consists of key components, which would make the study more accurate, reliable and applicable. These key components are outlined as here under:

1.11.1 Credibility

Credibility refers to the quality and trustworthy of the research findings. It is akin to internal validity in a study and is achieved through prolonged engagement, persistent observation, and triangulation (Ahmed, 2024). It also ensures that the data and findings correctly represent the reality of the participants. Techniques such as member checking, where data and interpretations are taken back to participants for validation, are used to enhance credibility (Kakar, Rasheed, Rashid & Akhter, 2023).

I used the principles of transparency and ethical integrity to ensure the credibility of the study. The sampled educators, who teach NS-TECH grade 6 were free to comment and share their experiences in teaching NS-TECH grade 6, documents related to NS-TECH grade 6 were perused to ascertain the data collected through the interviews

1.11.2 Transferability

Transferability implies how the research findings could be applied to other contexts or settings (Kakar et al., 2023). Transferability is achieved by providing a detailed description of the research context and participants, allowing others to determine the applicability of the findings to their own settings (Ahmed, 2024). The study's findings may be applicable to other schools and circuits in order to address the challenges identified in the study. The findings will be applied to other schools within the Rekopantswe circuit and other circuits in the District of Bojanala and ultimately to the province and the country.

1.11.3 Dependability

Dependability in a study refers to the consistency and reliability of the findings, ensuring that the results are stable over time and across different contexts. Dependability ensures that the research process is logical, traceable, and documented, allowing others to replicate the study and achieve similar results (Egon, Eugene & Rosinski, 2023).

Dependability involves the consistency of the research findings over time. It is ensured through rigorous documentation and the creation of an audit trail, which allows for the replication of the study under similar conditions (Ahmed, 2023). The data collected in the study was triangulated and I maintained an audit trail for verification and reference. The sampled educators, who teach NS-TECH, were interviewed, documents related to NS-TECH were analysed and lesson observations at the sampled schools were conducted for consistency and reliability.

1.11.4 Confirmability

Confirmability ensures that findings are found in the data produced by participants rather than the bias of the researcher. It is achieved through practices like reflexivity and maintaining a neutral stance throughout the research process (Arsian, 2022). The use of triangulation and peer debriefing helps in minimising researcher bias and ensuring that the findings are a true reflection of the participants (Nguyen et al., 2021). To guarantee confirmability within this study, I refrained from employing any form of bias or attempting to influence the narratives provided by the participants. The sampled educators are qualified and experienced in teaching NS-TECH, and were able to respond to interview questions confidently without the influence by the researcher

1.12 ETHICAL CONSIDERATIONS

According to Chasokela (2024), ethical considerations in research studies encompass a broad range of principles and practices designed to ensure the integrity of the research process and the protection of participants. Furthermore, Al Khatib and Al Khatib (2022) confirmed that ethical considerations guide researchers in making informed decisions that respect the rights and dignity of participants, ensure data integrity, and maintain public trust in research outcomes.

I ensured that all data concerning participants would be kept confidential and anonymous. However, information regarding the participants' gender, qualifications, teaching experience, and current position will be essential. This enables a thorough comprehension of participants' backgrounds to determine how their experiences influence the performance of their professional duties.

The key aspects of ethical considerations are outlined as follows:

1.12.1 Informed Consent and Participant Protection

Informed consent is a fundamental ethical requirement, ensuring that participants have knowledge of the purpose of the research, the risks involved, and the importance of the research before agreeing to participate (Al Khatib & Al Khatib, 2022). This process empowers participants to make informed decisions about their involvement. Protecting participants, especially vulnerable groups, is paramount.

Researchers must adopt strategies to safeguard participants' identities and manage any distress that may arise during the study (Chasokela, 2024).

In the study, no participant was compelled or intimidated to partake in the research process. The entitlements of all individuals involved are clearly explained, with detailed information presented in the consent document, which they are required to sign. I refrained from intimidating the participants.

1.12.2 Data Privacy and Confidentiality

Data privacy and confidentiality are critical in maintaining the trust of participants. Researchers must implement measures to protect sensitive information and ensure that data is used responsibly (Dubey et al., 2024). The researcher commits to maintaining the confidentiality of all data and feedback provided by study participants throughout the research process.

1.13 LIMITATIONS OF THE STUDY

According to Clarke, Alley, Ghai, Flake, Rohrer, Simmons, Schiavone and Vazire (2024), limitations in research studies refer to the constraints or weaknesses within the research design that could affect the outcomes and conclusions. These limitations are part of the research process and acknowledging them is crucial for maintaining

academic integrity and providing a comprehensive understanding of the study's findings. The study was limited to the four schools out of twenty-eight schools in the Rekopantswe Circuit, where the research was conducted. In addition, only eight educators out of thirty-six NS-TECH educators in the circuit participated. As a result, the findings may not be representative of the broader teaching population and may not be generalised to other contexts within South Africa. Furthermore, the study did not capture the full diversity of multilingual classroom settings, which may have influenced the range of experiences reported. The focus was primarily on educators' perspectives, gathered through interviews and classroom observations, with less emphasis on learners' voices and experiences. This narrowed scope may have constrained the depth of insight into how the language influences learner engagement and comprehension in NS-TECH. The study was limited to four schools in one circuit, with the findings limited to eight educators. Whilst the insights are valuable, they may not be generalised to other contexts. The study did not include the learners' perspective, which could enrich the understanding of classroom dynamics.

1.14 DELIMITATION OF THE STUDY

According to Coker (2023), delimitations in a study refers to the boundaries set by the researcher to define the scope and focus of the study. It involves specifying what will be included and excluded in the research, thereby making the study manageable and focused on the research question.

Delimitation is also made much clearer by Reyes (2023), as intentionally set by the researcher to make the scope of the study to be narrow, feasible and relevant. This process is crucial for maintaining clarity and direction in research, especially in complex fields where the breadth of potential inquiry can be overwhelming.

The study was conducted in Rekopantswe Circuit of Bojanala District in the North-West province, and the study involved NS-TECH educators who are the custodians in the teaching of NS-TECH through English MOI.

1.15 CHAPTER OUTLINE

The chapters will be outlined as follows:

- **Chapter 1:** The chapter explains the introduction and background of the study, subsequently includes the study's rationale, problem statement, research questions, research aims, and objectives.
- **Chapter 2:** It includes a review of the literature. This entails comparing already published literature on the challenges educators face when teaching NS-TECH subject through ESL.
- **Chapter 3:** The chapter includes a research methodology, population and sampling of the study, processes of data collection, and how data is analysed and interpreted.
- **Chapter 4:** The chapter consists of the presentation of and its interpretation.
- **Chapter 5:** This chapter is on the discussion and analysis of findings. This chapter highlights the conclusion, summary, and recommendations of the study. A contribution to new knowledge is also given in this study.

1.16 CHAPTER SUMMARY

This study explored the experiences of Grade 6 educators in teaching Natural Science and Technology (NSTech) through English as a Medium of Instruction (MOI) in the Rekopantswe Circuit, North-West Province, South Africa. This introductory chapter served as a foundation, preparing the research on the experiences of educators in the teaching of Grade 6 NS-TECH through ESL, by outlining its background, aims, and objectives. The Chapter begins by highlighting the importance of language in teaching and learning English proficiency, which is directly linked to learners' performance in NS-TECH. Many learners in South African primary schools' face challenges when taught through English as a second language (ESL). Studies (Shubani and Mavuru, 2022; Montgomery, 2023) show that learners struggle with abstract scientific concepts and verbal participation when English is the medium of instruction. Globally, similar challenges are reported in the United States, Germany, Tanzania, and Kenya, where multilingual learners often perform worse than monolingual peers (Buxton and Lee, 2023; Feser and Haagen-Schützenhöfer, 2023; Brock-Utne, 2023). Despite these

challenges, teaching Science through English is increasingly common worldwide, aligning with STEM goals and the Sustainable Development Goals (SDGs).

It provides a short overview of the literature, limitations and delimitations, which are expanded in subsequent chapters, and introduces the research methodology, including design, paradigm, trustworthiness, and ethical considerations. This chapter is crucial as it formulates the research questions and provides signposts of the study. The following chapters provide details on the study at hand, drawing relevant information from various academic sources.

CHAPTER 2: THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1 INTRODUCTION

Chapter 1 explored the introduction and background of the study. In Chapter 2, the researcher will highlight the various theoretical perspectives that involve the experiences of Grade 6 educators in teaching Natural Science and Technology (NS-TECH) through English, as a second language, within the Rekopantswe Circuit. Theoretical framework provides signposts between what one is learning and the broader body of knowledge, further helps to provide reasons as to how and why certain things happen the way they do and provide a context on research findings. By using a theoretical framework, researchers can ensure their study is based in existing theories and contribute meaningfully to the academic field (Nardo, 2021).

Chigbu, Atiku and Du Plessis (2023) state that a literature review is a process through which different research works of a particular academic topic are being critiqued by a researcher. The constructive criticism process, involvement of the collection of information related to the topic or subject at hand, with the aim of achieving the new outcomes which were never achieved before.

In addition, literature reviewing is made up of several activities including searching, identifying, reading, analysis, interpretation, summary and citation (Hazari, 2023). The first part provides the theoretical foundation for this study and related implications. The next section will then consider literature relevant to related content, which focuses on accounts of educators of the teaching of NS-TECH through English within contexts contributed by learners who are non-English speakers.

2.2 THEORETICAL FRAMEWORK

According to Nardo (2021), the theoretical frame guides research in two important ways. First, it provides a simple, clear, and systematic summary of the relationship between concepts, theories and ideas which bear upon the research problem.

Clearly defining key variables enables researchers to refine their concepts, interpret results accurately, and contribute meaningfully to the knowledge base, forming essential groundwork for both research methodology and field analysis.

Chapter 2 deals with the theoretical framework, which is derived from Lev Vygotsky's sociocultural theory and forms the basis of this study. The sociocultural theory will give guidance in researching about the experiences of educators, when interacting with the grade 6 learners in the NS-TECH class, taught in ESL. This chapter presents an overview of Vygotsky's sociocultural theory as the foundation of the study, followed by a discussion of the ZPD, mediation, social interaction, and cultural tools. It concludes with an analysis of strategies and their implications for learner outcomes in Grade 6 NS-TECH taught through ESL, as well as educator experiences.

2.2.1 An Overview of Sociocultural Theory by Vygotsky

Sociocultural theory is a sociology and psychological theory that has to do with the vital role played by one's culture, environment and community in developing an individual. It showcases how people interact with each other towards cognitive development, learning and sociocultural (Main, 2023). The theory is relevant to the study in the sense that, the teaching of NS-TECH occurs within the society, influenced by culture and language spoken by educators and learners. This idea from developmental psychology also emphasises the importance of sociocultural beliefs and values in performing these functions. This theory looks at Rekopantswe Circuit community's contributions towards the development of Grade 6 learners, particularly in NS-TECH, which is taught in English. The sociocultural theory deals with the effect of social interaction amongst people's cognitive development. Sociocultural theory maintains that the development of knowledge in humans is fundamentally a social event, indicating that the cognitive functions of individuals are reliant on their interactions with peers, notably those who possess heightened abilities (Lantolf, 2021). In the context of this study, the sociocultural theory is appropriate as the Grade 6 NS-TECH learners are always engaged in a social process in a classroom, learn from each other for cognitive and language development.

Part of the sociocultural theory, a person's psychological development is largely brought about by someone in authority, like nurturers or educators. Nonetheless, social and yet their niche events result in the individual development of a person's sense of belief. The influence which peers and mentors have on learning such information also bring our attentions back again to this theory. Individuals' attitudes and cultural beliefs have a big effect on the cognitive development study habits of people.

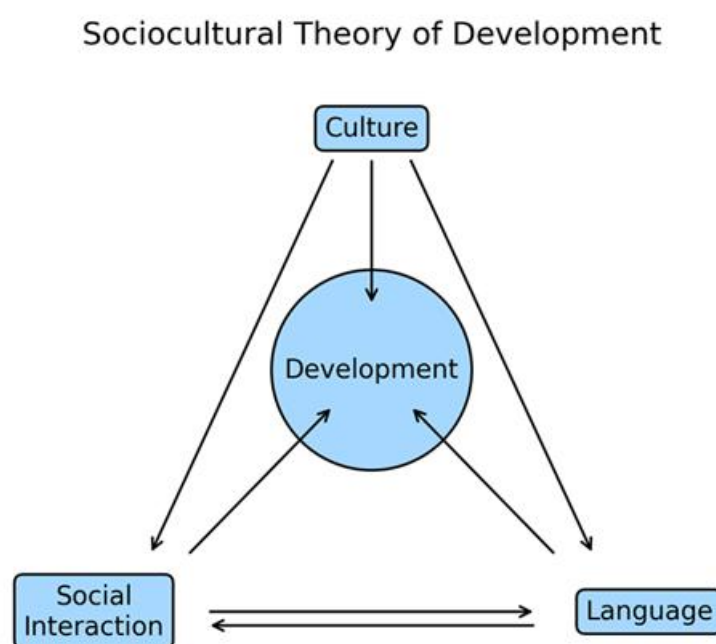


Figure 2.1: Vygotsky's Theory, McLeod (2025).

2.2.2 The Zone of Proximal Development (ZPD)

The ZPD refers to the difference between what a child can accomplish when working on a task alone versus with the assistance of a more knowledgeable person (Sage, 2022). It is all about skills and knowledge that a learner can perform under guidance and through observing the more advanced learners. The ZPD is relevant to this study because it involves observation, which is a critical skill in Grade 6 NS-TECH class, where learners perform practical tasks in groups, through which they observe one another and learn from each other.

It involves all of the abilities and knowledge that someone can only apply or understand under guidance. Learners may extend their psychological developmental level and skills, primarily by observing slightly more advanced learners than themselves. Therefore, they may progressively expand this Zone by learning independently and through the guidance of a more knowledgeable person, there should be a reasonable balance between the independence learning and guidance learning. Figure 2.2 illustrates the ZPD illustrates the learning process, which a learner undergoes.

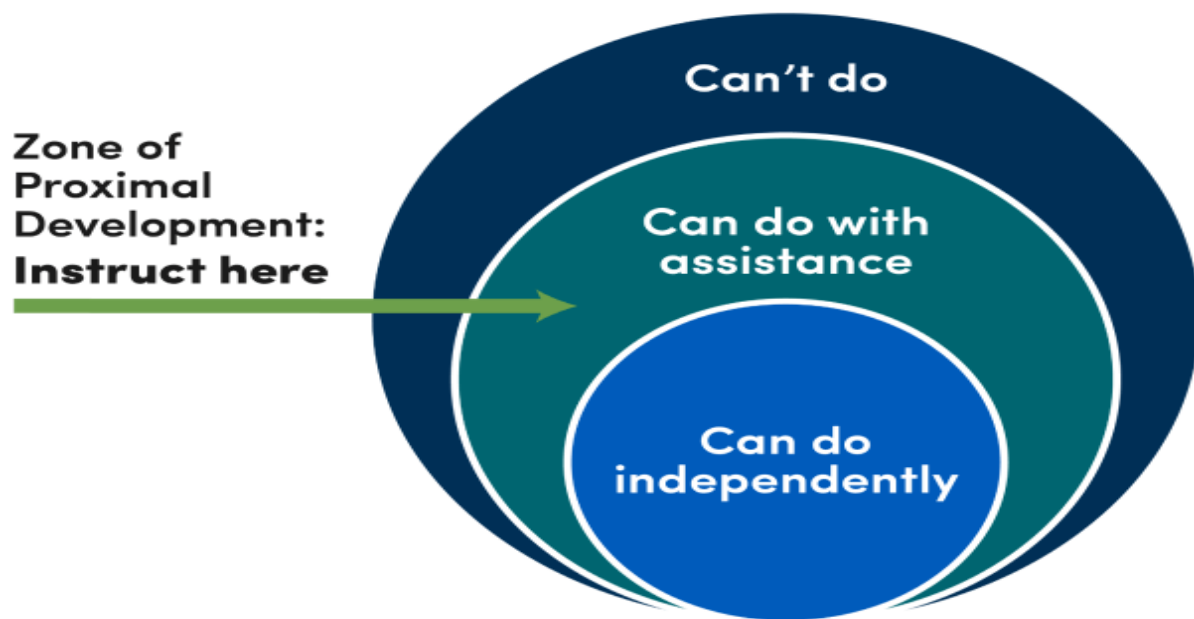


Figure 2.2: Zone of proximal development - Source: Main (2023)

2.2.3 Mediation

Mediation constitutes the core principle in human sociocultural activity that explains the origin and development of different types of sociocultural consciousness through Creativity, defined as personal expression that forms our identity (Ramos, 2023). Mediation is a process that serves as a bridge between two (or more) cultures and plays a key role in a range of contexts (Xirofotou, 2025). In the context of this study, the process of mediation plays an important role in the sense that the NS-TECH content and language of teaching are to be mediated during NS-TECH lessons. The mediation process in NS-TECH could involve strategies such as Interactive Experiments, in which the NS-TECH content will be mediated practically, when

learners touch, smell, see by doing experiments to have a deeper understanding of scientific concepts.

Mediation can also be applied through the integration of ICT like visual aids, using diagrams, models, or videos to explain complex ideas of the subject and the content could be mediated for a better understanding amongst learners (Zhong, 2022).

According to Puntambekar (2022), scaffolding is another strategy to be used for mediation processes, providing step-by-step guidance and gradually reducing support as learners become more independent and confident. Language and discussion could motivate learners to speak and discuss freely to express their thoughts and collaborate amongst themselves.

2.2.4 Social Interaction

The social interaction learning theory is a theory that argues that people learn by watching other people in a social setting (Chuang, 2021). Added to this is Heron's (2021) explanation of social interaction as a key component of the sociocultural perspective, highlighting its central role in the learning process. When interaction takes place between educator and learner, or among learners themselves, we call it classroom talk. It means learners are working together to explore ideas. The social interaction perspective is related to NS-TECH learning theory. In this learning setting, learners will engage in exchange of constructive talk with each other during experimental activities.

The figure below illustrates the social interaction learning theory by Vygotsky:

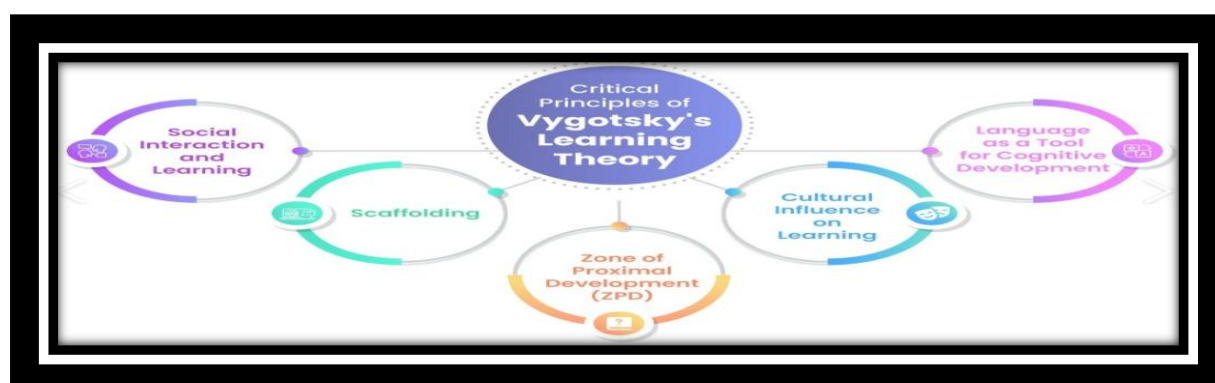


Figure 2.3: Vygotsky's Theory, McLeod (2025).

2.2.5 Cultural Tools

Cultural tools in the context of this research refer to the technological products and practices created by communities to convey messages, to learn and to interact with each other and the environment at large (Borge, 2020). The researcher concurs with the statement by Borge (2020), in the sense that these cultural tools are very important in NS-TECH lessons, including for cognitive development. Learners and educators should interact, share ideas and understanding of concepts, use artefacts for experimentation. Within the current technology-oriented context, learners and educators in NS-TECH may use digital tools like educational apps, videos, and simulations to make abstract concepts more tangible. For instance, a simulation of chemical reactions can visually demonstrate processes that are hard to describe in words.

The language itself is also regarded as a crucial tool to convey and explain scientific concepts. The language must be simple and understood by learners when used as a tool of communication in NS-TECH classroom. Diagrams, models, and experiments are essential cultural tools in NS-TECH, Kumanda, Chiphambo & Mtisi (2022). For example, using a model of a windmill can assist learners to understand the energy changes and mechanisms used to draw the underground water.

2.2.6 Analyses and Implications of Strategies on Learner Outcomes with Regards to NS-TECH Taught in ESL

The application of the ZPD as an educational strategy substantially enhances teaching practices in Natural NS-TECH and Technology (NS-TECH) in the context of ESL. The incorporation of ZPD into teaching, enables educators to develop adapted strategies that cater educational needs of individual learners, promoting both independent learning and active participation (Wei, 2024).

Observation and adaptation strategy is about educators who could check and observe learners progress during the learning process and pick up their respective ZPDs. This is done to design lesson methods appropriate to the learners' needs, background and abilities (Wei, 2024).

Scaffolding techniques involve the provision of relevant support that enable learners to execute and complete activities associated with NS-TECH, that they cannot complete independently, thus supporting learners to acquire NS-TECH knowledge and skills (Wass & Golding, 2020).

The researcher's analysis indicates that the ZPD offers a strong foundation for improving the teaching of NS-TECH through ESL; however, challenges persist in its practical implementation, particularly in ensuring that all learners receive adequate support across diverse contexts and backgrounds.

2.3. SUMMARY OF THEORETICAL FRAMEWORK

The theoretical framework is based on Vygotsky's sociocultural theory, which provides a strong foundation to determine the experiences of educators interacting with Grade 6 NS-TECH learners, who are taught through ESL.

The strategies involve the ZPD, which acknowledges the gap between what learners know and can perform as individuals and what they can achieve with support and intervention from educators and fellow peers. Educators play a pivotal role in scaffolding NS-TECH learning and language development.

Social Interaction and learning put emphasis that meaningful learning occurs through social interactions, and educators should create an environment whereby learners are able to discuss, communicate and share NS-TECH ideas, that will enable subject content and language development. Another strategy behind Vygotsky's sociocultural theory is based on cultural and language mediation whereby the importance of language as a tool for cognitive development is important.

Scaffolding strategy enables educators to provide support through teaching NS-TECH by using visual aids, group discussions and practical experiments to improve the understanding of the content and language proficiency. All these strategies will shape the educators' experiences, challenges and how to improve the effectiveness of teaching of NS-TECH in the classroom.

2.4 LITERATURE REVIEW RELATED TO THE STUDY

To start placing one's contributions inside the scholarly discourse, a literature study identifies the major authorities, methodologies, and theoretical underpinnings of a subject (Venecek and Bauer, 2022). The literature review serves to build a researcher's credibility by helping to focus the research and showcasing the researcher's knowledge and comprehension of the scholarly discourse surrounding the chosen topic.

This section reviews literature related to challenges faced by educators and learners in teaching and learning NS-TECH through English, in a context where learners are not English speakers. The section explores the overview and background of ESL as a MOI, in the teaching of NS-TECH. Furthermore, the section addresses the policies that affect the language-in-education policies, including the Constitution of South Africa. The discussion highlights the challenges and barriers in implementing the ESL policy in the teaching of NS-TECH.

Prior studies have investigated language barriers in science education; much of the existing literature remains focused on general challenges of English as a medium of instruction. There is limited analytical work that applies Sociocultural Theory aligned to the experiences of educators teaching Natural Sciences and Technology (NS-TECH) through English as a second language in rural South African contexts. Constructs such as the Zone of Proximal Development, mediation, and cultural tools are often discussed without being connected to classroom practices, research design, or data interpretation in ESL science education. The socio-economic realities of rural schooling, such as overcrowded classrooms, limited resources, and low parental support, have been minimally researched. This study, therefore, outlines a gap by integrating Sociocultural Theory with the experiences of Grade 6 educators, who teach NS-TECH through English as a second language in multilingual rural classrooms

The literature review also identifies ways to promote the use of ESL as the language of teaching and learning and outlines intervention strategies to deal with the challenges of teaching NS-TECH through ESL. The last and concluding remarks will be in the form of a summary of the chapter.

2.5 THE OVERVIEW AND BACKGROUND OF USING ESL AS A MOI IN NATURAL AND TECHNOLOGY (NS-TECH) EDUCATION

The use of ESL as the MOI in NS-TECH education has a multifaceted impact on learners' academic performance and understanding of scientific concepts. The integration of English in NS-TECH education can enhance language proficiency and academic achievement, particularly in multilingual settings.

However, it also presents challenges related to language comprehension and cultural identity. This answer explores the effects of using EMI in NS-TECH education, drawing insights from various studies (Ameen, 2024).

According to (Ameen, 2024), studies have shown that teaching scientific subjects in English can significantly improve learners' English language skills and overall academic performance. For instance, in Iraq, learners who studied NS-TECH in English outperformed their peers who studied in Arabic, suggesting that continuous use of English in scientific instruction enhances both language proficiency and academic success. However, the use of EMI presents challenges, as adopting English as the medium of instruction may raise concerns about cultural identity, especially in regions with strong linguistic heritage. In Bangladesh, there is scepticism about the potential loss of Bengali due to the dominance of English instruction (Rahman, 2024).

Teaching NS-TECH through English as the language of teaching and learning in Tanzanian primary schools presents numerous challenges. These challenges stem from linguistic barriers, inadequate resources, and pedagogical constraints, which collectively hinder effective NS-TECH education. Educators often struggle with language proficiency, classroom management, and the usage of effective teaching strategies, all of which are exacerbated when using English as the MOI

Primary school educators in Namibia face several challenges when teaching NS-TECH through English, primarily due to the language policy and resource constraints. The change from mother-tongue instruction in early grades to English as the MOI in later grades creates a significant barrier for both educators and learners. This language shift, coupled with inadequate resources and training, impacts the

effectiveness of NS-TECH education in primary schools (Ndjangala, Abah and Mashebe, 2021)

Ndjangala et al. (2021) conducted a study in Namibia exploring Natural NS-TECH educators' perspectives on the obstacles affecting upper primary learners' (Grades 4–7) performance in the subject. A qualitative research design was employed, using face-to-face interviews to gather insights from NS educators. Seven educators who were teaching NS at the time of the study, were selected from different schools, using a purposive sampling method to participate in the study. The findings of the study revealed several key challenges affecting upper primary learners' performance in NS. These included EMI, lack of quality teaching resources and over-crowded classrooms.

Wilson and Mavuru (2023) state that teaching NS-TECH through ESL in South African primary schools presents several linguistic barriers for educators. These challenges are compounded by the multilingual nature of classrooms, where both educators and learners often speak English as a third or subsequent language. The complexity of scientific language, combined with limited English proficiency, creates significant obstacles in effectively delivering NS-TECH education. The following sections outline the key linguistic barriers faced by educators in this context

The study conducted by Wison and Mavuru (2023) in Limpopo, investigated the perceptions of multilingual learners regarding the influence of English and scientific language on their learning of NS-TECH in South Africa. The study highlighted the challenges faced by learners whose home languages differ from English, which serves as the LoLT in schools. The study identified the main challenge as English LoLT. The study also indicated that, according to learner experiences, English, which is often their second or third language, and scientific language posed significant challenges in learning NS-TECH, including difficulties in reading, writing, and understanding the content. It was also expressed that learner have an enthusiasm for learning NS-TECH in their home languages due to discomfort with English instruction. Relating to the study, learners perceived that English, often their second or third language, limited their understanding of scientific concepts, and they were uncomfortable with being taught in English.

2.6 SOME OF THE POLICIES THAT GUIDE THE LANGUAGE OF INSTRUCTION IN SOUTH AFRICAN SCHOOLS.

2.6.1 The Constitution of the Republic of South Africa (1996)

Liba and Coetzee (2013) state that the Constitution enshrines the principle of the rule of law, which dictates that no individual or entity, including the state, is above the law. All individuals and the state are accountable to the country's laws, and their actions are subject to adjudication by an independent judiciary. There are 11 official languages as according to the constitution of the country and NS-TECH as a subject in the school curriculum, should have a provision to be taught in the home languages of learners. The Constitution is the supreme law of the land, meaning that any law or conduct not in line with it is invalid. This ensures that all actions by the government and individuals are subject to constitutional scrutiny.

In the South African legal system, the Constitution mandates that each person has the right to basic education. This right is codified in Section 29(1)(a) of the Constitution of the Republic of South Africa (RSA, 1996). It states that everyone has the right to basic education, which includes adult basic education, and that measures must be taken to progressively make this education available and accessible. The term "everyone" as used within the Constitution encompasses all persons within the territorial confines of South Africa. This denotes that the right to education is not exclusively confined to the nationals of the state (RSA, 1996). The government is tasked with the duty to acknowledge, defend, promote, and realise the constitutional rights of all individuals within the nation by developing an educational system that is congruent with the requirements of the 21st century. The implementation of such principles would ensure that all learners, regardless of the presence of barriers or lack thereof, can fully engage in their academic pursuits of their capabilities.

The South African Constitution's Bill of Rights is a cornerstone of the country's legal framework, designed to protect and promote human rights and freedom. It is a comprehensive document that includes a wide range of rights, reflecting both traditional civil liberties and socioeconomic rights. The Bill of Rights is integral to South Africa's transformative constitutional agenda, aiming to deal with the past injustices and create a society based on democratic values, social justice, and human rights

(Moosa, 2018). Some key of the examples of human rights enshrined in the Bill of Rights of the South African Constitution, are the right to freedom of speech and expression, right to free movement and residence, right to political association and the right to education.

Within the framework of this research, the Constitution (RSA, 1996) maintains its significance, as the state, via its policies and legislation, should institute mechanisms that safeguard the educational rights of all citizens. The inclusive education policy is designed to render education accessible to all learners, aligning it with the mandates set forth by the Constitution.

In the context of this study the right to education is elaborated further. (Nyane, 2024) explains that the right to education is embodied in Section 29 of the South African Constitution. Section 29(1), which distinguishes between the right to basic education and the right to further education. Mbajorgu and Mafumo (2014) emphasise that Section 29 of the Constitution requires the state to ensure access to education, particularly basic education as a fundamental right. It is therefore of paramount importance that basic education be accessible to all the children of this country through their home languages. Within the framework of this research, the Constitution (RSA, 1996) maintains its significance, as the state, via its policies and legislation, should institute mechanisms that safeguard the educational rights of all citizens. The inclusive education policy is designed to render education accessible to all learners, aligning it with the mandates set forth by the Constitution.

2.6.2 The LiEP in South Africa of 1997

Language policies in South Africa have a profound impact on educational outcomes for learners from diverse linguistic backgrounds. The country's multilingual education policies aim to promote inclusivity and equity by recognising 11 official languages. However, the implementation of these policies face challenges, resulting in mixed educational outcomes. The transition from mother-tongue instruction to English as the MOI often leads to a decline in student achievement, particularly for speakers of indigenous African languages.

This complex landscape is shaped by historical, socioeconomic, and political factors, which continue to influence the effectiveness of language policies in education (Ogbonnaya and Dalsy, 2024).

Mulaudzi (2024) evaluated the 1997 LiEP in relation to inclusivity and multilingual education. The study used a conceptual framework grounded in inclusive education, translanguaging teaching method, and policy implementation, and examined the policy's objectives, scope, and efforts to promote equity and access for diverse language groups. Furthermore, the study indicated that there were disparities, which were specifically noted to be 'based on linguistic backgrounds' in South Africa. The study revealed that a student's native language or linguistic environment played a role in their access to quality educational opportunities.

The LiEP was designed to promote multilingualism by recognising 11 official languages and advocating for the use of learners' home languages in education (Nomlomo, 2019). Multilingual education policies have indicated to have positive impact on learning outcomes, although challenges remain in the implementation of such policies (Ogbonnaya and Dalsy, 2024).

While South Africa's language-in-education policies aim to promote linguistic diversity and inclusivity, the reality is that English continues to dominate educational spaces, often at the expense of African languages. This dominance reflects broader societal trends where English is perceived as a language of opportunity and global integration, which can attract parents to prioritise English-medium education for their children. However, this trend poses a risk to the preservation of linguistic diversity and the equitable development of all South African languages. Addressing these issues requires a concerted effort to align policy with practice, ensuring that all languages are valued and supported within the educational system

2.6.3 South African Schools Act (SASA) of 1996

Mulaudzi (2024) conducted a study that evaluated the LiEP of 1997, advancing inclusivity and multilingual education. The study critically analysed the norms and

standards of the SASSA that has significant implications for language policy and planning in South African schools, primarily aimed at promoting inclusivity and multilingualism. The Act, along with the LEP of 1997, seeks to address historical inequalities by recognising 11 official languages and promoting the use of indigenous African languages in education. However, the implementation of these policies has faced several challenges, including the dominance of English and Afrikaans, inadequate resources, and insufficient educator training. These factors have hindered the effective promotion of linguistic diversity and equity in South African schools.

2.6.4 The Curriculum and Assessment Policy Statement

The Curriculum and Assessment Policy Statement (CAPS) is a pivotal framework in the South African education system, introduced in 2012 to enhance the NCS. CAPS aims to provide a clear and semi structured approach to what is taught in schools, focusing on curriculum content rather than teaching methods.

This reform was initiated to address challenges identified in the NCS, to improve educational outcomes across various subjects (Ojo and Mathabathe, 2021). The implementation of the CAPS in South African schools has had significant effects on the language of instruction, particularly in the context of multilingualism and the dominance of English. CAPS aims to standardise education across the country, but its impact on language instruction is complex and multifaceted. The policy has been critiqued for its emphasis on English, which is often not the home language of many learners, leading to challenges in comprehension and learning outcomes. This has implications for both literacy and numeracy, as well as broader educational equity Sapire and Essien (2021).

Sapire and Essien (2021) point out that the South African school system, is constrained by the CAPS in terms of the LoLT. The study pointed out that the system tends to function as monolingualism rather than multilingualism, with dominance of one language. The study also identified a gap in research concerning language use in early grade mathematics classes in South Africa and its alignment with the linguistic backgrounds of educators and learners.

2.7 SOME OF THE CHALLENGES FACED BY EDUCATORS AND LEARNERS IN THE IMPLEMENTATION OF SECOND LANGUAGE (L2) AS A MOI

Learning and teaching in a classroom using a second language for MOI present several challenges (Yıldız, Soruç, & Griffiths 2017). These challenges are both varied in nature and scale, involving linguistic education, teaching practices, social and cultural dimensions. Learners should not only be conversant in English as the MOI for them to use it effectively in their learning, but educators too. This point cannot be ignored: language shapes meaning, and even the greatest ideas or theories can change when expressed in words that are not our own, limiting the depth of first-hand understanding. The challenges in teaching and learning concepts in the classroom using a second language as the MOI, are the problems involved in English reading material, understanding lectures, taking priced examinations, which are examinations for which a fee is charged, and participating in discussions in rooms or halls. These challenges can inadvertently prevent learners from understanding everything the content has to offer and destroy their overall academic performance (Tuan and Lan, 2024). Some of the challenges surveyed have been categorised as linguistic, pedagogical, and sociocultural challenges. It is necessary to unpack these challenges to provide a deeper understanding of them.

2.7.1 Linguistic Challenges

- **Language Proficiency:** Learners often struggle with understanding technical vocabulary and complex language structures in a second language, which can impede their comprehension of subject matter (Tuan and Lan, 2024).
- **Educator language Skills:** Educators may also face difficulties if they lack proficiency in the second language, which can affect their ability to deliver content effectively and respond to learners' needs (Yildiz, Soruç & Griffiths, 2017).

2.7.2 Pedagogical Challenges

- **Resource Constraints:** Limited resources, such as teaching materials and language support tools, can hinder the implementation of effective second language instruction (Sun and Yusof, 2024).

- **Educator Preparedness:** Many educators are not fully trained to teach in a second language, which can affect their ability to employ effective teaching strategies and manage multilingual classrooms (Sun and Yusof, 2024).
- **Time Limitations:** The limited amount of instructional time available for language learning can also limit opportunities for learners to practice and reinforce their language skills (Lightbown and Spada, 2019).

2.7.3 Sociocultural Challenges

- **Cultural Sensitivity:** The teaching material could be short of cultural relevant or respectfully, which would kill the learning will of learners or readers (Ma, 2023).
- **Multilingual Contexts:** In multilingual settings, the domination of one language over all others accomplished effectively exclude certain language groups and deepen social crises (Liyanage and Walker, 2019).
- **National language Policies:** In some regions, unresolved language policies complicate second language teaching implementation, as is the case with Kenya's experience (Dhillon and Wanjiru, 2019).

2.8 SOME OF THE BARRIERS EXPERIENCED BY EDUCATORS AND LEARNERS IN THE USE OF ESL MOI IN NS-TECH EDUCATION

Othman (2024) states that primary school learners in Malaysia face significant linguistic and cognitive challenges when learning NS-TECH through ESL. These challenges stem from the complexity of scientific vocabulary, the cognitive load associated with learning in a non-native language, and the sociocultural context of the learners. The transition to EMI in NS-TECH subjects has been particularly challenging for learners in rural areas and those with limited English proficiency.

Othman (2024) has conducted a study in that investigated the challenges faced by ESL learners in understanding the NS-TECH vocabulary within EMI classrooms, particularly in Malaysian schools. The study was conducted through a two-stage qualitative design, that is, Online Survey, that involved 103 participants and Group interviews, which involved individuals who came from diverse linguistic backgrounds. The findings of the study were that ESL learners in EMI NS-TECH classrooms face

challenges due to new scientific terminology, abstract subject concepts, and lack of prior exposure to the subject.

In essence, the study has identified the specific vocabulary challenges in EMI NS-TECH education for ESL learners, proposed strategies learners can use and recommended pedagogical improvements to reduce cognitive load and enhance learning.

Pun, Fu & Cheung (2023), state that in Japan, EMI is becoming increasingly common, particularly in NS-TECH subjects, as more learners who speak ESL or foreign language engage in these courses. The study concluded that there are significant language challenges that both educators and learners face in the Japanese EMI NS-TECH classrooms. These challenges can hinder effective communication and understanding of scientific concepts, impacting the overall learning experience.

The findings from these empirical studies were examined through a multidisciplinary lens, drawing from three fields of research: NS-TECH education, language policy, and applied linguistics. In addition to challenges, the study also outlined the proposed coping strategies to address the identified language difficulties within these EMI settings.

Kingali (2023) states that there are many challenges facing the use of English as the language of instruction policy in Tanzanian schools. These include low competencies in teaching methods, educators who are not qualified, the absence of guidelines related to English teaching methods. The challenges impact negatively towards the learning of content subjects as well as the learning of the English language itself. The article examines the English medium of instruction policy in Tanzanian schools, reviewing the theoretical foundations for adopting an additional language as the language of instruction and approaches that teach subject content through English.

The policy of using English as the MOI in Tanzanian schools, highlights the significant challenges and proposing strategies to improve the implementation. Some of the challenges identified by Kingali (2023) are low English proficiency amongst educators, which is a major hurdle, lack of qualified educators and inadequate guidelines on how to teach using English as the MOI. The mentioned challenges adversely affect the

teaching and learning of content subjects, when taught and learnt in a language in which both the educators and learners are not proficient.

Primary school educators in Namibia face key challenges in teaching NS-TECH through ESL, including constraints from the English monolingual policy, which restricts the use of learners' diverse linguistic resources (Set, 2023). This monolingual ideology hinders effective communication and understanding, particularly for learners with limited English proficiency. Educators often struggle to mediate access to NS-TECH learning while needing to navigate a linguistically diverse environment, necessitating flexible language practices.

Simasiku, Kasanda & Smit (2015) investigated why the Namibian government continued using English as the medium of instruction despite concerns from educators, learners, and other stakeholders. The sample comprised 12 educators at 12 schools in the Caprivi Educational Region. The results showed that ESL educators were of the view that the use of English as MOI affected learners' participation in English lesson and that it impacted negatively on learners' end of year results. This indicated a perceived link between the language of instruction, being ESL and academic performance.

In the South African context, English is prevalent in the education, economic and other sectors, which poses a threat to indigenous languages (Mncwango and Makhathini, 2021). However, learners' poor mastery of English creates a significant barrier to learning, particularly in rural schools of South Africa, where exposure to the language is often limited to the classroom. The study by Mncwango and Makhathini (2021) is based on a literature review, which explored language challenges in bilingual classrooms within rural South Africa. In these settings, most learners speak indigenous languages as their first languages. The study observed that educators may lack preparedness to address the grammatical demands of learners, and the exclusive use of English as the MOI itself acts as a barrier to learning.

Many educators in South Africa are ESL speakers, which affects their ability to teach effectively in English (Kekana and Montle, 2023). They often lack the necessary English vocabulary and confidence in teaching through the language, which impacts negatively on their teaching quality and the learners' understanding of the concepts related to the content subject.

Primary school educators in Tanzania, Malaysia, Japan, Namibia, and South Africa face several common challenges when teaching NS-TECH through ESL. These challenges are multifaceted, involving language proficiency, curriculum demands, and pedagogical strategies. The difficulties are compounded by the need to integrate language learning with scientific content, which can be particularly challenging in multilingual and multicultural classrooms. Below are the key challenges and insights from the research papers.

The countries face challenges in implementing EMI, the broader socio-political context and policy frameworks significantly influence the outcomes. In Tanzania, the abrupt transition from Swahili to English creates barriers to effective learning, whereas South Africa's more inclusive approach may offer better educational outcomes. However, both countries must address socioeconomic disparities and ensure equal access to quality English-medium education so that all learners benefit academically and in future employment opportunities. There should also be clear guidelines in both countries on how to teach content subjects like NS-TECH, using EMI.

2.9 INTERVENTION TECHNIQUES TO ADDRESS THE CHALLENGES OF TEACHING NS-TECH THROUGH ESL

Black and Allen (2020) define educational intervention techniques as semi structured strategies or actions implemented to enhance learners' learning experiences and outcomes. These interventions are designed to address specific educational needs, whether they are academic, behavioural, or emotional, and can be applied in various settings, including individual, group, or classroom environments. The primary goal of educational interventions is to facilitate changes in learners' abilities, behaviours, or attitudes, thereby improving their overall educational performance.

The following sections delve into some of the key aspects of educational intervention techniques to address the difficulties encountered by educators and learners in the teaching of NS-TECH.

2.9.1 Use of Multilingual Digital Tools

Amin, Taj & Amjad (2024) state that language barriers are a significant challenge in teaching of NS-TECH subjects in ESL contexts. Learners may struggle to comprehend

complex scientific concepts when delivered in a non-native language, leading to potential gaps in understanding and engagement. However, research indicates that the use of multilingual digital tools can help bridge this gap by providing translations and bilingual resources, thereby supporting learners' comprehension of technical vocabulary and concepts.

Additionally, the exclusive use of the school's language for teaching and learning can underestimate the potential of multilingual learners. This deficit orientation can hinder inclusive learning environments, particularly in STEM subjects Cavalcante, Gagné, & Le Pichon-Vorstman, (2024). However, innovative approaches such as multilingual digital tools and culturally relevant pedagogies can address these challenges by integrating learners' home languages and cultural backgrounds into the curriculum (Le Pichon, Cavalcante, Gagne, & Sauvage, 2024).

2.9.2 Resource Availability

Resource availability is another critical factor in teaching NS-TECH in ESL contexts. Many schools, particularly in under-resourced settings, face limitations in accessing digital tools, internet connectivity, and multilingual resources. For instance, in rural and remote regions of Azerbaijan, limited internet access and insufficient educator training hinder the effective use of digital tools for language learning (Huseynova, 2024)

Despite these challenges, digital tools such as Duolingo, Babbel, and Quizlet, enhance learners' motivation, vocabulary retention, and speaking fluency in ESL classrooms (Huseynova, 2024). Likewise, integrating information technologies increases engagement and access to diverse resources, supporting language acquisition (Huseynova, 2024). However, the digital divide remains a significant obstacle. Unequal access to technology and insufficient resources can exacerbate existing inequalities in education. To address this, targeted educational policies and educator development programmes are essential to ensure the effective integration of digital tools in under-resourced areas (Bang, 2024)

2.9.3 Educator Training for ESL NS-TECH Education

Educator training is a cornerstone of effective ESL education, particularly in NS-TECH subjects. The increasing diversity in classrooms necessitates specialised training for educators to manage multilingual environments effectively. Research highlights the importance of equipping educators with the skills and knowledge to cater to the needs of multilingual learners (Tuimebayeva, Shagrayeva, Kerimbayeva, Shertayeva, Bitemirova, & Abdurazova, 2024).

Specialised training programmes have shown to significantly improve educators' ability to teach in multilingual classrooms, promote inclusive education, and improve the achievement of learning outcomes (Tuimebayeva, et al., 2024). These programmes often focus on innovative pedagogies, such as the use of digital tools, collaborative learning strategies, and culturally relevant teaching methods (Tuimebayeva, et.at., 2024).

However, challenges such as limited access to professional development opportunities and the need for ongoing support persist. For instance, in Nepal, educators often rely on alternative methods and personal devices to overcome resource limitations, emphasising the need for adequate training and resources (Singh, 2024).

2.9.4 Opportunities for Innovation in ESL NS-TECH Education

Despite the challenges, there are numerous opportunities for innovation in ESL NS-TECH education. The integration of technology, such as language learning apps, virtual classrooms, and interactive multimedia tools, offers transformative potential for language acquisition and scientific understanding (Siumarlata 2024).

Collaborative learning approaches, such as project-based learning and online discussion forums, also offer opportunities for promoting critical thinking, communication and teamwork skills among learners (Sartini et al., 2024). These approaches not only enhance for the language acquisition but also prepare learners for the demands of a globalised and digitised world.

2.10 SUMMARY OF THE CHAPTER

This chapter reviewed literature on challenges in implementing NS-TECH education, including limited verbal explanations of scientific concepts, poor learner–educator communication, low English proficiency, weak alignment with inclusive education policy, insufficient training and resources, and the impact of overcrowded classrooms on inclusive education. The literature was formulated from various studies that were undertaken internationally. The theoretical framework that underpinned this study was also formulated and discussed. The following chapter focusses on the research methodology.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

This chapter describes research approaches, both main and sub-questions for the study. According to Ghanad (2023), research is the systematic investigation into resources and materials to establish facts and reach new conclusions. The main and sub-questions provided in Chapter 1 served as a guide for the empirical investigation.

The study employed a qualitative case study design to explore the experiences of Grade 6 educators. A case study provided an in-depth understanding of the challenges, strategies, and perceptions of the four primary schools sampled within the context of the Rekopantswe circuit. Eight educators from the four schools participated actively in the study, which was conducted at four primary schools, situated in Bosplaas village in Moretele Municipality, Bojanala District, North-West Province of South Africa.

Interpretivism has been employed in the study, and it is based on the notion that reality is subjective and mediated through social relations. It is concerned with meanings and the experiences of people and often uses qualitative methods of interviewing and observation (Bryda and Costa, 2023). The interpretive framework is highly pertinent to this research project, as qualitative data were gathered through semi-structured interviews, systematic observations, and thorough document analysis. The sampled NS-TECH educators were engaged in semi-structured interviews, and lesson observations were conducted to triangulate the data collected. Relevant documents such as textbooks, assessment records, and moderation reports were all analysed to add to the collected data.

3.2 RESEARCH CONTEXT

According to Shehadeh (2020), contextualising research means ensuring that it connects with already-existing literature and the situation in which it was conducted. Contextualisation has appreciated the micro-(institutional) and macro-level (geographic) contexts, which offer credibility and support to this research. In a research project, the research context covers the environment, situation, and elements that include and thus shape the research design. It comprises the site where research

is done; the variables in operation; plus, larger socio-political and cultural factors which may affect the study itself. In this way, understanding the research context is important because it assists in the interpretation of findings and so results in their most efficient application. The study at hand was done at four primary schools in Bosplaas, Dihibidung, Danhouse and Mathibestad villages, which are in Bojanala District, Moretele Local Municipality, Rekopantswe Circuit in particular

The topographical reference map below, indicates the villages in the Rekopantswe Circuit.

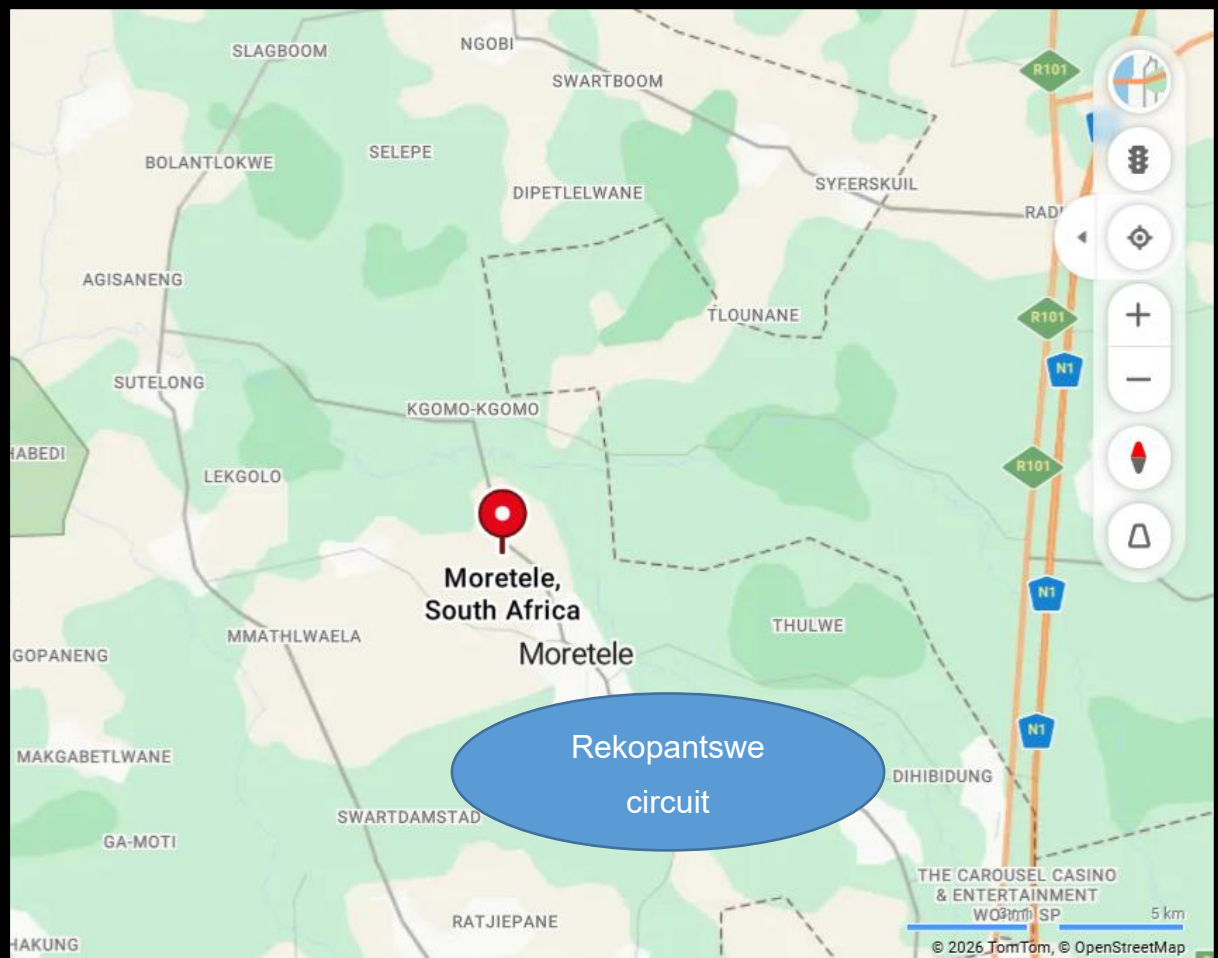


Figure 3.1: Map of Moretele municipality, Rekopantswe circuit, South Africa.

Source: TomTom & OpenStreetMap, 2024



Figure 3.2: A picture showing the low socioeconomic levels in most of the families in Rekopantswe Circuit



Figure 3.1: Deteriorating conditions of one of the participating schools, in Rekopantswe circuit



Figure 3.2: Participating school: indication of broken windows as some of the difficult conditions in Rekopantswe Circuit

3.3 RESEARCH APPROACH

The study followed a qualitative approach, a multiple case study in Rekopantswe Circuit. Qualitative research is basically descriptive, focusing on an in-depth grasp of phenomena (Sa'adah, 2023). It often uses analysis to clarify processes and meanings, frequently shaped by theoretical frameworks that align with the research conclusions. I chose a qualitative research approach because it aligns with the study's research question, as Bekcan (2022) notes that researchers must clearly link their purpose to the chosen method. The study emphasises that the method in scientific research is a purposeful research plan that enables the achievement of research goals. By following

the correct method, I aim to uncover the social reality, thereby ensuring that the chosen method aligns with the research's objectives.

Marlina, Purwaningsih, Siagian, Al Hakim & Maryati (2024) outline the key characteristics of a multiple case study as qualitative research that include its focus on clarifying ambiguity and discovering various realities through methods such as unstructured interviews, in-depth interviews, and direct observation. This approach outlines the importance of data reliability and validity, often using triangulation to enhance the depth of data collected, reduce bias, and increase credibility. Triangulation method involves techniques, such as data sources, methods, investigators, and theories, to enhance the research's validity, transferability, confirmability, and dependability.

In this study, data was collected through semi structured interviews and allowed the participants to express their views freely without any interruptions and to avoid biasness in the study.

3.4 RESEARCH DESIGN

The study employed a qualitative case study design to explore the experiences of Grade 6 educators. A case study provided an in-depth understanding of the challenges, strategies, and perceptions of the four primary schools sampled within the context of the Rekopantswe circuit. Eight educators from the four schools participated actively in the study, which was conducted at four primary schools, situated in Bosplaas village in Moretele Municipality, Bojanala District, North-West Province of South Africa. A qualitative case study method was chosen because it enabled the engagement with educators lived experiences in detail, capturing the challenges around language, method and socio-economic context. This method was chosen because it suited to the study's interpretive paradigm, which aims to understand how meaning is developed in multilingual classrooms, particularly in the teaching of NS-TECH.

Thematic analysis followed Braun and Clarke (2006) six-step process, ensuring that there is a systematic identification of patterns. Narrative comments by educators were captured during the interviews, while themes were interpreted through Sociocultural Theory

3.5 RESEARCH PARADIGM

A research paradigm is a full set of beliefs, values, ontological, epistemological and entomological attitudes and egos to which researchers are committed regarding research (Mann, 2022).

It is a belief system and value orientation that informs both what scientists see, and how they investigate phenomena. It is this framework that enables research methods to be organised and ensures that studies are carried out in a philosophically sound manner. The present work was based on an interpretative paradigm, using the methodology of a descriptive case study. The data collected from the NS-TECH setting has been interpreted from the descriptive case study to draw conclusions related to English as the language of instruction.

3.6 Population

The word “population” means the entire set of individuals or objects that one wishes to study (Beck, 2024). A characteristic is a term describing a group of things based on a shared quality or qualities. The study population is very important as it defines the range of the study results and generalisation. Researchers generally must deal with a sample, which is a part of the population, for practical reasons based on time, money, opportunity, and convenience. It is important to have a representative sample to help draw inferences about a population based on results in a sample. The study population of the research is Moretele Local Municipality, which has 105 primary schools that are divided into five circuits, each circuit having 21 schools offering the NS-TECH subject.

3.7 Sampling

Sampling improves efficiency and reduces costs while striving to obtain a sample that supports meaningful analysis. In qualitative research, the depth and quality of insights depend largely on the effectiveness of the sampling process. Furthermore, Bell, Harley and Bryman (2022) argued that one important feature of qualitative research is sampling according to characteristics, which means choosing research subjects that

have specific characteristics. The vigorous data background must be in common with the research question. This way of analysis can bring forth abundant and overlapping facts, allowing worthy of the phenomenon under study. Sampling was performed on the four primary schools in Rekopantswe Circuit. In this study, sampling is purposive because the participant population is the primary school sixth-grade teaching staff who have a minimum of 5 years' experience in NS-TECH. The educators were chosen based on a minimum of 5 years of teaching experience in NS-TECH, currently teaching grade six.

3.8 DATA COLLECTION TECHNIQUES

According to Flick, Wa-Mbaleka & Ekoto (2025), data collection techniques are necessary processes in research. They systematically accumulate and measure information on specific variables to answer research questions or appraise outcomes. The selection of the method depends on the research target, the type of data, and the background of its being gathered. In this science study, a qualitative research method of multiple case studies was employed; the application of semi-interviewing, non-participant-observation and document analysis has all captured data on how educators are teaching NS-TECH Grade 6 through E-S.L. learners experienced their own way through lecture platforms. These methods were able to solve the research question at hand.

3.9.1 Interviews

Hamblin (2024) maintains that research interviews empower their researchers to collect information at the very source, especially in qualitative research. This gives rise to face-to-face situations of one kind or another between parties: the researcher and those researched. Much of the participants' experiences revealed personal details not generally known, and at times, important information was lost when minor examples overlapped during interviews. Intellectual interviews can be semi-structured or unstructured, with all offering different levels of freedom and depth in data collection. Interviews must be designed with a clear purpose, which in turn matches the research questions and goals.

3.9.2 Semi-structured interviews

Belina (2023) states that semi-structured interviews are a qualitative research method that puts together the elements of semi-structured and unstructured interviews. This method produces in-depth insights into participants' motivations, attitudes and experiences. The conversational nature of semi-structured interviews enables researchers to discover unexpected information and reveal complex social phenomena. This, in turn, frees them from merely gathering data for their theory.

In the study, semi-structured interviews were arranged for the participants, who are grade 6 NS-TECH educators. According to Osborne and Grant-Smith (2021:1727), "In a semi-structured interview, the interviewer's knowledge of their subject allows them to ask questions after participants' answers which they would not have attempted in more rigid interview formats. This helps to uncover new layers of meaning." The interviews were recorded, and the data transcribed for analysis.

The semi-interview schedule was guided by the following research questions:

- What challenges do Grade 6 educators face when teaching Natural Sciences and Technology (NS-TECH) through the English medium?
- How does the use of EMI impact the teaching strategies employed by Grade 6 educators?
- What are the perceptions of Grade 6 educators regarding learners' understanding and engagement in Natural Sciences and Technology (NS-TECH) taught through English?
- What support do Grade 6 educators receive from school management and district officials to address language-related challenges in teaching Natural Sciences and Technology (NS-TECH)?
- What strategies do Grade 6 educators use to overcome language barriers in teaching Natural Sciences and Technology (NS-TECH)?

3.9.3 Observation.

Observation in research, a term coined by Aidan O'Donnell, refers to systematically watching, listening, and taking notes (Wade-Berg, 2022). Sagatbekkyzy and Shalgynbayeva (2022) explain that observation may be semi structured, semi

structured, or unstructured, and can be conducted in participant or non-participant form, depending on the study's purpose and the level of interaction required. The observation method is often used in combination with other research approaches, such as interviews or questionnaires, which ensure a better understanding of far-reaching problems in the realm of social events. The observation was done to observe both the educators and learners. The Lesson observation method was used to determine how learners interact during the NS-TECH lesson, how the educators used the English language during the lesson, the integration of digital tools, and the usage of NS-TECH equipment for a practical NS-TECH lesson. The observations provided the researcher with more clarity related to the study.

3.9.4 Document Analysis

Marcelino-Aranda, Martínez Cuevas and Camacho (2024), say that document analysis is a series of steps that allows researchers to obtain data from documents, whether these are private letters or public policy papers. This means of investigation is valuable when other methods of collecting information are impractical or when the documents themselves present the whole datum. The method is flexible so that researchers can change it to suit their own needs and research objectives. As documented by Marcelino-Aranda et al. (2014), document analysis typically consists of several stages, including searching, choosing, collecting, sorting, classifying, organising, reviewing, interpreting, and presenting data. The process is flexible and can depend on the needs of the researcher or the depth of analysis required. In this study, the analysed documents include learners' textbooks, NS-TECH moderation reports, question papers and memoranda, and NS-TECH Grade 6 mark sheets. The listed documents were analysed to check on the on how learners perform when they are taught NS-TECH in English and the language used in the chosen textbooks. The moderation reports were analysed to verify the consistency, validity, and fairness of assessments in terms of the content and not being biased in terms of the language of teaching and learning.

3.10 DATA ANALYSIS

According to Kordel and Gruber (2024), data analysis is critical in the course to undertaking such research. It acts as bridge between raw data and making meaning out of it, can also be seen what sort of tricks affect the training of mathematicians! It

involves a series of methodical steps to ensure that data is accurately interpreted to answer research questions and support decision-making. Qualitative analysis of data, for example focuses on non-numeric data. In this field there are numerous techniques learnt from papers such as “content analysis”, “narrative analysis” and “coding” that one may employ with results-speaking or else, the researchers use qualitative data analysis to make sense out of the survey findings.

The researcher used narrative data analysis. The data collected through semi - structured interviews; analysis of documents and observations were analysed to summarise the conclusions related to NS-TECH grade 6.

3.11 ETHICAL CONSIDERATIONS

Al Khatib and Al Khatib (2022) state that the ethical considerations in research studies are key to upholding the integrity, safety, and respectability for participants who are involved with study work. These considerations cover a number of principles and practices that guide project researchers in responsible and ethical conduct. Furthermore, Hosseini, Jackson and Bahramnezhad (2023) state that ethics in research works involves protecting participants and their rights as well as pleasing journalists with better news (i.e. truth). Autonomy upholds individuals’ right to make informed decisions; non-maleficence prioritises avoiding harm; beneficence promotes participants’ well-being; and justice ensures fair treatment and equitable distribution of research benefits. Ethics for this study were considered and observed. The permission was granted by the Circuit manager of Rekopantswe, the eight NS-TECH grade 6 educators signed the consent forms and agreed to be part of the study, the principals and SGBs of the selected four primary schools have also signed the consent forms, allowing the researcher to use their schools for the study. Assent letters for learners were also signed by the learners themselves under the supervision of their parents or guardians. The researcher obtained the ethics certificate from the university and presented it to the four schools and all the stake holders that were part of the study.

3.11.1 Confidentiality and Anonymity

Al Khatib and Al Khatib (2022) state that the primary ethical obligation is to protect the privacy of those taking part, and to ensure that their data remains confidential. Researchers must take action to protect personal information and ensure that the data

is only used for the purposes of learning as intended. With anonymity, participant information is diminished or concealed in order to avoid identification. Confidentiality, on the other hand, relates to how personal data disclosed by participants is treated. It is seen as unethical to share this information (Bickford & Nisker, 2015). All participants in this study were made to understand the purpose and assurance was made to maintain confidentiality, such that the participants became free to participate actively. The consent forms were very clear in terms of the confidentiality and anonymity. The researcher used pseudonyms and codes to conceal the identity of schools and educators who took part in the study.

3.11.2 Safety and Risk Management

Safety requires ethical consideration, compliance with regulations and protocols to safeguard risks. Researchers are advised to create safety measures for different stages of the research project. In this study, the school environments, where the research was conducted, were free from harm. The school premises are securely fenced with security officers at the entrances to ensure the safety of everyone in the school premises. The risks of scheduling conflicts were mitigated by having flexible plans and obtaining support from the principals. The risk of having language barriers may affect the clarity of responses, especially if teachers switch between English and Setswana. Code switching was allowed during the interviews

3.11.3 Ethical Clearance

The ethical clearance for this study was formally granted by the Ethics Committee of Unisa, following a rigorous review of the research proposal to ensure compliance with established ethical standards and guidelines. This approval confirms that the study adheres to key ethical principles, including respect for persons, voluntary participation, informed consent, confidentiality, anonymity, and the protection of participants from harm. Furthermore, it affirms that the research was conducted with integrity and in accordance with institutional and national ethical requirements governing educational research.

3.12 TRUSTWORTHINESS OF QUALITATIVE DATA

Credibility, transferability, dependability and confirmability are considered as the four main dimensions of trustworthiness in qualitative research (Ahmed, 2023). This is crucial to increasing the credibility and meaningfulness of qualitative research.

The researcher followed these components to ensure trustworthiness, as explained hereunder:

3.12.1 Credibility

Ahmed (2024) explains credibility as the ‘truth value’ of the findings in a qualitative research report, and it happens by means of data collecting, prolonged engagement, persistent observation, and triangulation. In this study, validity was established by using triangulation in the form of semi -structured interviews. The credibility of this study was established as the educators from various schools voluntarily agreed to participate in the study using the semi-structured questionnaire. The interviews facilitated my gathering rich information on the implementation of inclusive educational policy; the participants articulated their views in detail. Credibility was strengthened through effective engagement in the schools, persistent observation of classroom practices, and triangulation across the interviews, observations, and document analysis

3.12.2 Transferability

According to Kakar et al. (2023), transferability refers to the extent to which qualitative findings can be applied to other contexts or settings. It is achieved through detailed and comprehensive descriptions of the research context and participants.

In this study, the researcher ensured that the participating educators from different schools in the Rekopantswe Circuit represented the population of Grade 6 NS-TECH educators in the Bojanala District. The researcher ensured that the findings would apply to similar contexts, particularly where NS-TECH is taught through ESL.

3.12.3 Dependability

It is stated by Kakar et al. (2023), that dependability involves the consistency of the research findings collected over a period and across different researchers. It is akin to reliability in quantitative research. I ensured dependability by asking the participants to review the transcribed summary of their interviews, checking for accuracy, and invited them to contribute their new information. Dependability was supported by checking members, while confirmability was ensured through an audit trail of coding and decisions on interpretation

3.13.4 Confirmability

Confirmability is concerned with the objectivity of the research findings, ensuring that the findings are shaped by the participants' experiences rather than researcher bias (Kyngäs, Kääriäinen & Elo, 2020). The researcher ensured objectivity during the data collection process by allowing the participants to be free during the semi - structured interviews.

3.14 CONCLUSION

This chapter outlined the qualitative research methodology adopted for the study, including the use of a case study design within an interpretive framework. The chapter explained the data analysis procedures used to ensure credibility and reliability. The next chapter presents a summary of the research findings. The methodological choices were deliberately related to the study's interpretive paradigm and theoretical framework. The qualitative case study design provided the base required to explore the grade 6 educators' experiences in multilingual NS-TECH classrooms, while teaching through English second language. Data analysis followed a thematic process, ensuring that the findings are credible, dependable and grounded in Sociocultural Theory. Through triangulation, in depth engagement and member checking, the study enhanced trustworthiness and the comments by educators were well represented

CHAPTER 4: PRESENTATION AND INTERPRETATION OF FINDINGS

4.1 INTRODUCTION

The preceding chapter explained the research methodology, which involved the research approach, research design, research paradigm, population and sampling techniques, data collection instruments, and the procedures for data analysis. Additionally, the previous chapter explained the ethical considerations and the issues of trustworthiness pertinent to the research. The current chapter articulates and analyses the findings of the study derived from the collected data, which was informed by the research questions presented in the study.

The data presented in this chapter was obtained through observations, interviews, and document analysis, as these served as the primary instruments for data collection. To uphold the principle of anonymity and in consideration of ethical standards, this chapter employs codes that function as pseudonyms rather than using the actual names of participants. This chapter adopts a thematic methodology to systematically present and analyse the findings. As a result, the data was organised, streamlined and clarified to tackle the research questions. The approach for interpreting the data included becoming familiar with the dataset, creating codes, examining and assessing themes, as well as defining, categorising, and understanding the collected data.

4.2 DEMOGRAPHIC INFORMATION OF PARTICIPANTS

The study was conducted in four primary schools in Rekopantswe Circuit, Bojanala District in North-West province. The schools are in the village of Bosplaas in Moretele Municipality.

The schools are close to each other in terms of distance as the distance between the schools is estimated to be between 5 and 7km from each other. In maintaining the ethics in research and ensuring confidentiality in the study, by protecting the participants' personal information. The chosen schools were given codes. The participants in the study were allocated codes in adherence to their school codes. The study consisted of four selected schools, meaning that the study comprised School **P**, School **Q**, School **R** and School **S**. In each of the four sampled schools, two participants were selected. In School P, the participants were two women; in School

Q, one male and one woman, School R, two men, while School S had one man and one woman.

Two educators per school were sampled to ensure the validity of the data by confirming with the two educators of the same school. These were educators who taught NS-TECH. The sample consisted of both genders to avoid bias.

Participants' biographical information is shown in Table 4.1. The Selected schools in the study were given codes to represent their identities. The goal of this information is to indicate that there was a representation of both men and women in the study. Table 4.1 indicates the personal information according to the sequence: participants' code name, gender, NS-TECH teaching experience, highest qualification, and whether the educator was trained on how to teach NS-TECH in English, workshop attendance on NS-TECH content and school codes.

Table 4.1: Participants' Biographical Data

Code name	Gender	NS-TECH Teaching experience	Highest qualification	Training on How to teach NS-TECH in English	Workshop attendance on NS-TECH content	School codes
HH Educator	F	10 years	B. Ed	NO	YES	P: Primary
JJ Educator	M	15 years	B. Ed HONS	NO	YES	P: Primary
KK Educator	M	8 years	PTD (S)	NO	NO	Q: Primary
LL Educator	M	7 years	B. Ed	NO	Yes	Q: Primary
MM Educator	F	9 years	B. Ed HONS	NO	Yes	M: Primary
NN Educator	M	10 years	M. Ed	NO	Yes	M: Primary
PP Educator	F	11 years	B. Ed	NO	YES	B: Primary

RR Educator	M	5 years	B. Ed	NO	YES	B: Primary
Total	Men 5	Women 3				

Key: M= Male, F=Female, PTD= Secondary Educators Diploma, BED= Bachelor of Education, Hons= Bachelor of Education Honours, MED= master's degree in education

Table 4.2: Profile of Participating Schools: School P

Characteristic of schools	School P
Province	North West
District	Bojanala
Circuit	Rekopantswe
Type of school	Rural
Quintile level	Q2
LoLT in grade 6	English
Total Learner enrolment in 2025	582
Number of NS-TECH educators	2
Are educators professionally qualified? YES/NO	YES
Availability of Science Equipment/Lab YES/NO	NO
Availability of Educators, who are English first language speakers- YES/NO	NO

Table 4.3: Profile of Participating Schools: School Q

Characteristic of schools	School Q
Province	North West
District	Bojanala
Circuit	Rekopantswe
Type of school	Rural
Quintile level	Q2
LoLT in grade 6	English
Total Learner enrolment in 2025	682
Number of NS-TECH educators	2
Are educators professionally qualified? YES/NO	YES

Availability of Science Equipment/Lab YES/NO	NO
Availability of Educators, who are English first language speakers- YES/NO	NO

Table 4.4: Profile of Participating Schools: School M

Characteristic of schools	School M
Province	North West
District	Bojanala
Circuit	Rekopantswe
Type of school	Rural
Quintile level	Q2
LoLT in grade 6	English
Total Learner enrolment in 2025	324
Number of NS-TECH educators	1
Are educators professionally qualified? YES/NO	YES
Availability of Science Equipment/Lab YES/NO	NO
Availability of Educators, who are English first language speakers- YES/NO	NO

Table 4.4: Profile of Participating Schools: School B

Characteristic of schools	School B
Province	North West
District	Bojanala
Circuit	Rekopantswe
Type of school	Rural
Quintile level	Q2
LoLT in grade 6	English
Total Learner enrolment in 2025	704
Number of NS-TECH educators	3
Are educators professionally qualified? YES/NO	YES
Availability of Science Equipment/Lab YES/NO	YES –Few items but there is no Lab
Availability of Educators, who are English first language speakers- YES/NO	NO

Data was collected from the subject educators, teaching in primary schools in Rekopantswe Circuit. I selected the participants as they were implementing NS-TECH curriculum in Grade 6, at their respective schools. I made use of three methods of data

collection, namely, semi -structured interviews, document reviews and non-participant lesson observations.

4.3 PRESENTATION AND INTERPRETATION OF DATA FROM INTERVIEWS

In this study, interviews were selected as the main tool of data collection process. However, for reliability of the findings and triangulation, observations and document analysis were also used. The participants were eight educators. The participants were selected to give responses regarding the experiences of Grade 6 educators in teaching NS-TECH through English. The following information and themes were raised: During the interviews, the sub-questions were developed from the research questions, which were ultimately converted into main themes of the study. The underneath is the presentation and interpretation of findings that reflect individual responses from the participants.

4.4 THEME 1: CHALLENGES GRADE 6 EDUCATORS FACE WHEN TEACHING NATURAL SCIENCES AND TECHNOLOGY THROUGH THE ENGLISH MEDIUM

Many schools, particularly in rural areas like Rekopantswe Circuit, lack the necessary facilities and resources to support effective science teaching. Teaching NS-TECH through English presents challenges for Grade 6 educators in multilingual contexts such as Rekopantswe Circuit, including limited access to teaching materials and technology needed to engage learners and support understanding. These challenges are primarily rooted in language barriers, the complexity of scientific language, limited learner participation, teaching strategies, and the lack of resources and support. Educators must navigate these obstacles to effectively deliver the content and ensure student comprehension in NS-TECH.

Table 4.5: Participants' responses on challenges that Grade 6 educators face when teaching NS-TECH, through English

Research objective	Sub-themes
To identify the challenges encountered by educators in teaching NS-TECH Grade 6, through ESL	• Language and communication challenges • Difficulty in relevant and adapted teaching strategies

	• Limited learner participation and engagement • A Material and Resources constraints
--	--

4.4.1 Language and Communication Challenges

The participants indicated that when teaching NS-TECH in English, they encountered the following challenges regarding language and communication. Learners' limited English skills affected their understanding of scientific and technological concepts. Educators also had difficulty in explaining and defining new NS-TECH terms in simple English language for the Grade 6 learners to understand. There was an over-reliance on code-switching and this impacted negatively on the contact time and ultimately on content coverage and learning outcomes. Below are verbatim responses provided during the interviews:

HH Educator: it takes a lot of contact time when I have to explain and translate English NS-TECH terminologies into the learners' home languages.

RR Educator: Learners are not coping with instructions given in English as the second language, they cannot respond or communicate through English. I then have to adapt to their language for them to understand the instructions and concepts.

It is also difficult for me to cover the content specified for that week or term as learners take a lot of time to understand through English, as it is their second or even third language. It is time consuming to code switch from time to time during the lesson.

4.4.2 Difficulty in Relevant and Adapted Teaching Strategies

The following responses related to the theme were given by the participants:

PP Educator: NS-TECH is a practical subject and learners have to follow the instructions to perform experiments or practical tasks. These instructions are given in English, which makes it difficult for the Grade 6 learners to follow, and then becomes crucial that I have to code switch and explain the instructions in details.

NN Educator: some of the scientific concepts or terminologies are difficult to translate in Setswana or Sepedi for these learners to have meaning. This makes it difficult for me as an educator to adapt teaching methods. However, at times I use visual aids to demonstrate the meaning of unfamiliar concepts. We have limited visual aids at our school and this makes it difficult on certain topics where we do not have such visuals.

According to the above responses from the participants, there must be a balance between the curriculum demands and learners' language levels. The responses indicated that there were difficulties in teaching practical experiments and scientific inquiry through English. Most learners found it difficult to follow the instructions to perform an experiment, which were given in English. Educators struggled to tailor their teaching strategies to integrate language support with NS-TECH teaching and learning. Below are verbatim responses given during the interviews:

4.4.3 Limited Learner Participation and Engagement

The responses from the participants revealed that there was reduced learner confidence and less participation in class discussions when conducted in English. Learners were afraid to express their ideas and were reluctant to communicate in class during NS-TECH group discussions. Below are verbatim responses that were given during the interviews under the sub-theme:

MM Educator: Learners are less confident when asked to speak or answer questions in ES L during NS-TECH lessons. They become free when I allow them to speak in their own language, especially during group discussions. I always encourage them to speak in either English or Setswana; they are allowed to practice translanguaging.

KK Educator: My learners are reluctant to speak in English when asked to respond verbally during the lessons. There is always less learner participation when learners are not allowed to speak in their native language. Shubani and Mavuru (2022), found that learners avoid speaking in English as a second language during Science lessons due to fear of mistakes, low confidence, and limited vocabulary. Learners only participate actively during peer group discussions because they are using their preferred language.

4.4.4 Material and Resources Constraints

The participants responded that there was no availability of NS-TECH teaching and learning resources and textbooks in the learners' home languages. There was an over-reliance on English-only textbooks, which most learners could not read with meaning. There was limited use of visual, practical, and multilingual resources to support the comprehension of NS-TECH concepts, content, and skills. Below are verbatim responses given during the interviews:

JJ Educator: as the NS-TECH educator, I rely mostly on the English-based textbooks as they are the ones available for me to source the information required to teach.

PP Educator: Our school has limited resources to do practical tasks and experiments. I use most of the worksheets, which are written in English and we do not have materials or worksheets written in Setswana or Sepedi for these learners to have a clear understanding of NS-TECH concepts.

4.4.5 Summary of Theme 1

This theme was about the challenges encountered by educators when teaching NS-TECH in English. The participants indicated the difficulties experienced by both the educators and learners during the NS-TECH lessons. The responses showed that the challenges were categorised into pedagogy, linguistic and systemic challenges

4.5 THEME 2: THE EFFECTS OF TEACHING NS-TECH THROUGH ENGLISH SECOND LANGUAGE AS THE LANGUAGE OF TEACHING AND LEARNING

The sub-questions derived from the main research question aligned to Theme 2 sought to establish the effects of teaching NS-TECH through ESL, assessing how language influences the learner's comprehension of concepts and content related to NS-TECH. The responses further revealed educator methodology and broader systemic equity within multilingual classrooms, like those in Rekopantswe Circuit.

Table 4.6: Participants' responses on the establishment of the effects of teaching NS-TECH through ESL, as a MOI

Research objective	Sub-themes
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To establish the effects of teaching NS-TECH through ESL, as a MOI.	• Learner Effects-Comprehension and conceptual understanding • Educator related effects • Systemic effects
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4.5.1 Learner Effects- Comprehension and Conceptual Understanding.

The data indicated that most Grade 6 learners showed misinterpretation of NS-TECH concepts. The participants further responded that learners at their schools had difficulty in understanding abstract terms, particularly the Term 4 Planet Earth and Beyond concepts. There was reduced problem-solving ability amongst learners due to lower confidence in English class discussions and reluctance to collaborate in English.

This was confirmed by HH Educator and KK Educator as follows:

HH Educator: Most learners in our school have some difficulties in understanding the term 4 content and concepts: Planet Earth and beyond. Learners do not relate to such content in their daily lives, and they are unfamiliar with the language used.

KK Educator: Learners just memorise the concepts without meaning. This is due to the English language used for teaching and learning. These learners do not understand abstract terms, and we do not have relevant resources to mediate the abstract concepts. Learners are less confident and reluctant to participate in English during class discussions.

4.5.2 Educator Related Effects

According to participants, educators adapted their pedagogy to support learners' language development by using code-switching, simplifying NS-TECH terminology, and incorporating visual aids and real-life objects. The NS-TECH educators stressed balancing the curriculum coverage as prescribed by CAPS and language support. The responses from the interview were as follows:

KK Educator: I code switch at any given time to ensure that my learners have a clear understanding of NS-TECH concepts, verbal questions that are I asked, so that they respond accordingly during the lesson.

RR Educator: The best thing I usually do is to code switch for my learners to have meaning of the content and I also use the local context to explain the content much simpler for learners to make meaning.

4.5.3 Systemic Effects

The participants indicated through their responses that the available textbooks were only English-based and did not cater for the learners' different home languages, predominantly Setswana. The participants further indicated that the lack of multilingual teaching aids exacerbated the challenge of not understanding the NS-TECH concepts in English. Policy context was also mentioned as one of the systemic effects, where policy dictated that NS-TECH in Grade 6 must be taught in EMI. The interview responses from the interview were as follows:

MM Educator: The Department of Education should design and deliver textbooks which cater for English and the home languages of learners.

LL Educator: The Basic Department of Education should supply us as educators, the NS-TECH dual medium dictionaries to explain concepts in different languages for all these learners to have meaningful learning of the subjects

4.5.4 Summary of Theme 2

According to the responses by participants under Theme 2, teaching NS-TECH through ESL shapes learning at three interconnected levels, i.e. learners, educators and the system itself. The participants' responses indicated that learners were experiencing some difficulties when it came to comprehension, active participation, engagement and performance. Their responses indicated that educators regularly adjusted their pedagogy to support Grade 6 learners' language development, especially within a system that lacked responsive and relevant teaching resources.

4.6 THEME 3: HOW GRADE 6 LEARNERS LEARN WHEN TAUGHT NS-TECH IN ENGLISH SECOND LANGUAGE

Understanding how Grade 6 learners acquire knowledge when taught NS-TECH in ESL is crucial for optimising educational strategies and enhancing the learning outcomes. The use of technology and creative teaching methods plays a significant

role in enhancing the learning outcomes. This involves leveraging digital tools, learner centred approach and creation of effective learning environment.

Table 4.7: Participants’ responses on the establishment of the ways, of how Grade 6 learners learn when taught NS-TECH in ESL

Research objective	Sub-themes
To establish the ways, of how Grade 6 learners learn, when taught NS-TECH in English second language	• Language mediated learning strategies • Assessments and demonstration of learning • Collaborative and social learning • Engagement and classroom participation

4.6.1 Language Mediated Learning Strategies

In relation to the language mediated learning strategies, the participants indicated that educators use code-switching between home language and English, to assist learners to understand NS-TECH terminologies and concepts. The interviews also revealed that during group work and experiments, learners used collaborative discussions and peer translations. It was also indicated that visual aids were largely used to mediate teaching and language barriers during NS-TECH lessons.

Interview responses on the sub-theme were:

JJ Educator: I always apply translanguaging strategy to simplify difficult concepts and words in NS-TECH. My learners are free to talk in groups as peers and I allow them to express themselves in any language they feel comfortable, to boost their confidence.

NN Educator: The learners I teach, enjoy experiments because they work collaboratively. I also integrate visual aids to guide them as they follow the steps of the experiments and to support my explanations to them.

MM Educator: I use the strategies of hands-on activities and peer support, because learners talk to each other as peers in smaller groups, and this reduces the language gaps amongst learners.

4.6.2 Assessments and demonstration of learning

The responses from the interviews were:

PP Educator: the performance of learners is better in term 3, when learners are purely assessed through practical work. Learners demonstrate learning through hands on activities better than the pen and paper tests.

HH Educator: NS-TECH is assessed through different forms of Assessment, of which one form of assessment is practical task, in which learners perform better. The NS-TECH analysis of results in grade 4,5 and 6 indicates that our learners perform better in term 3 where learners are doing projects and practical work. The demonstration of knowledge acquired, is through the application of knowledge and skills by doing hands on tasks or projects

The participants' responses in this category revealed that most learners performed better in projects and practical work than written tests. Projects and practical tasks did not require much verbal and written communication, hence the better performance on these than the English-medium written tests.

The responses also indicated that learners were able to demonstrate their learning with confidence through projects, more than through written tests.

4.6.3 Collaborative and Social Learning

During the interviews, educators stated that learners supported each other during peer group work and collaborative discussions. The participants further maintained that peer group discussions enhanced cooperative learning and overcame language barriers. According to the participants' assertions, the collaborative and social learning strategy supported learner participation and interaction. Learners collaborated as they learned in a social way.

Interview responses under this sub-theme were:

LL Educator: Learners learn better, when they learn on their own in teams. According to my experience and observation, the learners in my class participate actively when they discuss and share ideas amongst themselves. I

just facilitate and ensure constructive discussion is taking place and the discussion is collaborative about the topic at hand. I also give them questions to answer in their groups, which will also ensure that the discussions are focused.

KK Educator: I prefer group work and collaborative strategy, to overcome the language barriers because learners express themselves in the language of their own preference and they can support each other as peers.

4.6.4 Engagement and classroom participation

Interview responses were:

RR Educator: My classroom becomes lively in a constructive way when I integrate technology in my NS-TECH lesson. Video clips related to the topic at hand, will always fascinate my learners and activate learner participation because they will be looking at the video and making meaningful learning. The English language gaps are reduced by using visuals like video clips during lessons.

PP Educator: The confidence levels amongst learners is usually low. When learners are expected to discuss through ESL, there is less classroom participation. Learner participation is increased when they are allowed to answer in their home language, if it is relevant to NS-TECH and the topic at hand.

The participants' responses highlighted that the confidence level of learners was low when they discussed and expressed the NS-TECH concepts and terminologies in English. There were always less classroom participation and engagement when English was used as an MOI. The educators also highlighted that they used a code-switching strategy and visual aids like digital videos to enhance learner participation.

4.6.5 Summary of Theme 3

This theme set out to establish the ways, of how Grade 6 learners learn when taught NS-TECH in ESL. The interviews revealed that learners' learning depended on how they constructed understanding of scientific and technological concepts, often relying

on memorisation, translation and visual aids, while language barriers contributed to misconceptions and limit deeper reasoning.

It was further found that social and collaborative processes demonstrated the importance of peer support, code-switching and cooperative learning in closing linguistic gaps.

4.7 THEME 4: STRATEGIES TO IMPROVE THE TEACHING OF NS-TECH GRADE 6 IN ESL

Developing strategies to improve the teaching of NS-TECH in Grade 6 for ESL learners is crucial for enhancing educational outcomes (Seilova, 2024). Theme 4 sub-questions examined how educators in the Rekopantswe Circuit developed strategies and showed that integrating effective methodologies, technology, visual aids, code-switching and translanguaging improves learners' language acquisition and understanding of NS-TECH concepts. Integration of these strategies would support learners to engage with the NS-TECH curriculum content effectively.

Table 4.8: Participants responses towards the development of strategies to improve the teaching of NS-TECH Grade 6 in ESL.

Research objective	Sub-themes
To develop strategies to improve the teaching of NS-TECH Grade 6 in English second language	• Language support strategies • Teaching methods and strategies • Assessment and feedback methods • Teaching and learning Resource development and use • Learner centred strategies

4.7.1 Language Support Strategies

The collected data indicated that educators used different approaches when teaching NS-TECH, with the purpose of simplifying and scaffolding scientific terms. They also stated that the effective use of code-switching and translanguaging in NS-TECH classrooms assisted learners to have a deeper understanding of concepts presented in English. The interviews also revealed the learners were supported to use a bilingual glossary of words as a strategy for teaching and learning, coupled with visuals and real-life objects and examples.

Interview responses were:

JJ Educator: I use translanguaging strategy to support learners when it comes to language barriers, and to simplify NS-TECH terminologies. I also apply code-switching as a strategy, use visual aids and bilingual glossary of words to simplify scientific definitions.

4.7.2 Teaching Methods and Strategies

Educators' responses during the interview stressed that the teaching approach was crucial for learners who were not EFL speakers. Some of the strategies used were experiments and group discussion methods. Educators also indicated that they used a differentiated method of teaching to cater to the different levels of English proficiency amongst learners. This is how some of the participants responded:

NN Educator: I personally, I use translation of words for complex terminologies and code-switching is also integrated during presentation of my lessons. I also lead my learners during peer group discussions and allow learners to express their views and ideas in their own home languages.

RR Educator: I use question answer method as a strategy to prompt the learners during NS-TECH lessons, to communicate and express their own thoughts.

4.7.3 Assessment and Feedback Methods

The data on assessment confirmed that NS-TECH educators designed assessment tests, which should assess the scientific knowledge rather than English language competency. The data further confirmed the use of alternative forms of assessment like projects and practical work, rather than being over-reliant on written tests. The responses also revealed that NS-TECH educators provided constructive feedback to learners, that supported both language development and content learning.

Verbatim interview responses were:

HH Educator: Our Professional Learning Committee (PLC) consist of educators from neighbouring schools in a cluster, and this is a structure responsible to set assessment tests for NS-TECH. The tests assess the content related to the subjects. Learners are not penalised for language mistakes. However, the mistakes are being attended during the constructive feedback.

4.7.4 Learning and Teaching Support Material Selection, Development and Use

According to Mokiwa and Gumbo (2025), effective resources, such as laboratories and smartboards, facilitate interactive learning and improve learner engagement. Conversely, inadequate resources can hinder learner educational outcomes. LTSM are crucial for learners to understand NS-TECH content and concepts. This was confirmed by the educators who responded to LTSM questions by stating that the creation of multilingual resources and visual aids was beneficial to the learners who learned through ESL. Sutherland (2022) found that interactive simulations such as *Explore Learning Gizmos* helped English Language Learners grasp scientific concepts more deeply and improve their academic vocabulary, meaning that the use of digital tools and interactive simulations assisted learners in overcoming the English language barriers and grasping the NS-TECH concepts deeper. The English NS-TECH textbooks were adapted to accommodate the home language of the Grade 6 learners.

MM Educator: As a school and Science Department, we utilise visual and interactive resources to facilitate teaching and learning. Practical examples and code-switching are used to clarify concepts.

JJ Educator: ESL acts as a barrier towards effective teaching and learning in my NS-TECH lessons. I mostly intervene by using digital tools like video clips where learners would see concepts like evaporation, electrical connections, electrical circuits and components, etc. that's how I overcome the language barriers amongst my learners.

4.7.5 Learner Centred Strategies

Interview responses were:

PP Educator: NS-TECH is a practical subject, and I give my learners an opportunity to do practical work twice a week, in which they are at the centre of

their own learning process. I only provide guidelines for procedure and supervision. Hands on activities where learners are central and active participants of learning, enhance the achievement of the educational outcomes.

RR Educator: I personally implement the approach of allowing learners to be at the centre of their own learning and being active participants of their own learning. Learners are given the opportunity to communicate in their own language of preference and that boost their confidence and reduce the issue of experiencing language barrier amongst learners who are taught in ESL.

According to Gyeltshen et al. (2025), as learners engaged in collaborative learning and problem-solving, their confidence and independence grew, leading to improved academic performance. The findings illustrated the importance of integrating active, inquiry-based strategies, in which learners are at the centre of their own learning, create a more engaging and effective science learning environment. The participants confirmed that a learner centred approach is helpful and practised by encouraging peer collaboration and cooperative learning during the NS-TECH learning process. They emphasised that through a learner-centred approach, learners became independent and critical thinkers, who created meaningful learning on their own.

4.7.6 Summary of Theme 4

The reviewed objective and sub-themes demonstrated that improving the teaching of NS-TECH Grade 6 through ESL required an integrated approach. Language support, method adaptation, valid and fair assessment, relevant resources and learner centred approach, must work collaboratively to ensure that language work as abridge rather than as a barrier to scientific knowledge. All the themes played a crucial role in the promotion of equity, inclusion and meaningful learning outcomes in NS-TECH Grade 6 classroom.

4.8 THEME 5: HOW THE DISTRICT OFFICIALS AND SCHOOL MANAGEMENT COULD SUPPORT THE NS-TECH GRADE 6 EDUCATORS, IN THEIR TEACHING THROUGH ESL

The sub-questions in Theme 5 sought to establish how support could be provided for the NS-TECH educators, who teach through ESL and how crucial it was for enhancing the educational outcomes. This support was very important because of the unique

challenges these educators faced, such as language barriers and the need for adapted teaching methods. School management teams and district officials played a pivotal role in facilitating this support, which could significantly affect both educator effectiveness and learner achievement.

Table 4.9: Participants’ responses on the establishment of ways on how the District Officials and School Management could support the NS-TECH Grade 6 Educators in their teaching through ESL

Research Objective	Sub-themes
To establish ways on how the District Officials and School Management could support the NS-TECH Grade 6 educators, in their teaching through SL.	• Professional development and capacity building for NS-TECH educators • Support on Curriculum Implementation and NS-TECH teaching methods • Assessment, monitoring and support • Provisioning of relevant resources

4.8.1 Professional Development and Capacity Building for NS-TECH Educators

The participants confirmed that the subject advisors as district officials provided training and workshops on content, assessment and methodology. However, the workshops did not address strategies for teaching NS-TECH through ESL. Their responses further confirmed that the School Management Teams (SMTs) conducted on-site monitoring, coaching and support to strengthen educator confidence.

Interview responses were:

LL Educator: Yes, we do attend Professional Support Forum meetings called by Subject Advisors on issues of NS-TECH content, assessment and teaching methods. The subject meetings are also helping us in terms of CAPS expectations. The workshops, subject meetings we attend, are not covering the part on how to teach through ESL.

HH Educator: I am happy about the support I get from both the District Officials and the SMT. The NS-TECH Subject Advisor visit our school once a term to provide support and guidance in the subject, whereas the SMT procure the

teaching and learning materials for the subject. I just need relevant teaching material to support me and learners on the language of teaching and learning.

4.8.2 Support on Curriculum Implementation and NS-TECH Teaching Methods

Interview responses were:

HH Educator: I am happy about the support I get from both the District Officials and the SMT. The NS-TECH Subject Advisor visit our school once a term to provide support and guidance in the subject, whereas the SMT procure the teaching and learning materials for the subject. I just need relevant teaching material to support me and learners on the language of teaching and learning.

The responses from the participants confirmed that educators were doing their best to implement the curriculum of NS-TECH. However, there were challenges related to the language of teaching and learning. (Caingcoy, 2023) has underscored the importance of culturally responsive teaching practices and the need for targeted professional development that supports educators in this dual task of teaching the content and integrating the second language as the medium of instruction. Educators indicated that subject advisors supported NS-TECH educators in interpreting and implementing CAPS to meet subject requirements, although language challenges were insufficiently addressed. The SMTs were on site to ensure continuity of what was expected through monitoring and support. The participants also suggested that the district officials should provide guidelines on how to adapt the content to the multilingual classrooms as way of supporting the NS-TECH educator.

4.8.3 Assessment, Monitoring and Support

Interview responses were:

KK Educator: Our Professional Learning Committee (PLC) consist of educators from neighbouring schools in a cluster, and this is a structure responsible to set assessment tests for NS-TECH. The tests assess the content related to the subjects. Learners are not penalised for language mistakes. However, the mistakes are being attended during the constructive feedback.

RR Educator: Assessment is monitored through District moderation. The Subject Advisors and SMTs are providing support where there is non-compliance of assessments conducted.

Based on the assertions by educators during interviews, one can deduce that the NS-TECH educators in Rekopantswe Circuit have structures referred to as PLCs, aimed to develop and moderate assessments to ensure quality and fairness. The participants made it clear that one of the roles of the PLCs was to ensure that assessment tasks measured the NS-TECH knowledge rather than penalising learners for weak English skills. It was also mentioned during the interviews that district moderation was conducted to ensure consistency and validity of assessments administered to the Grade 6 NS-TECH learners.

4.8.4 Provisioning of Relevant Resources

Interview responses were:

NN Educator: The textbooks we have for NS-TECH are English based as per the policy by the Department of Education. Our learners are not English-speaking, and the textbooks are only relevant for the content and concepts and do not cater the issue of the language. The visual aids like tablets are not available for learners. The teaching resources are limited and the English language creates a barrier for learners to learn effectively

PP Educator: I developed a bilingual glossary of some NS-TECH terminologies for my learners to have clarity. However, some of the NS-TECH terminologies are not included in the glossary.

According to the responses, most educators did not have visual teaching aids to mediate the teaching of NS-TECH, through EMI. Most of the available textbooks were English-based and it was the responsibility of the educators to adapt textbooks and digital tools to address the challenges of language barriers. The educators also highlighted that they developed glossaries to mediate the NS-TECH concepts which had been written in English.

4.8.5 Summary of Theme 5

The objective and sub-themes reviewed how the district officials and school management could support the NS-TECH Grade 6 educators in their teaching through ESL. The interviews demonstrated that there was a variety of strategies, which were implemented by both the SMTs and district officials for effective support of NS-TECH Grade 6 educators. These strategies focused on methodologies, integrating technology and providing professional development. However, there was still a lack of adapted textbooks to support learners in their home languages.

4.9 DATA INTERPRETATION FROM CLASSROOM OBSERVATIONS

Classroom observations were also conducted to collect data in the study. The observations were conducted at four sampled primary schools. The observations addressed two sub-research questions: the challenges Grade 6 educators faced when teaching NS-TECH through ESL, and the strategies they used to overcome language barriers. The observations were based on the following themes: language use and support; teaching strategies and methods; learner participation; classroom interaction; assessment; and teaching and learning resources.

4.9.1 Language Use and Support

Language is directly linked to how NS-TECH teaching is done and how learning occurs. Learners' understanding of NS-TECH concepts is largely dependent on the type of language used as they may simply memorise the terminology without meaning, if the language is not carefully used. According to the observations, learners were unable to follow instructions when asked in English. The observed educators code-switched and used translanguaging during the lessons to enable the learners to understand and follow the expected instruction.

4.9.2 Teaching Strategies and Methods

Observation of teaching strategies and methods revealed how educators adapted their methods to bridge the language gaps, ensuring that the NS-TECH complex concepts had meaning for learners. During the observations, it was revealed that educators used code-switching and visual aids to simplify the concepts and to mediate the

language difficulties amongst learners. Three of the eight educators had a bilingual glossary of new NS-TECH terminologies to simplify them for their learners.

4.9.3 Learner Participation

Learner participation is a critical component observed in NS-TECH lessons taught in ESL, because it provided the direct evidence of how learners engaged with both the NS-TECH content and LoLT. Learner participation revealed whether the learners understood the content or they had barriers to learning. Learner confidence and communication were measured through participation by asking and answering verbal questions. During the observation, it was found that most of the learners communicated freely when they were asked questions in their home language and very few learners, who were strong in English, participated actively when questions were posed in English. It was also observed that learners were actively participating during the practical lesson, in which tests were conducted. Learners were doing and were active participants of their own learning. The English language was mediated through practical investigation. Learners were noted to be actively involved when taught through digital tools. The photo below shows the integration of digital tools in teaching NS-TECH during the observation.



Figure 4.1: Integration of Digital Technology in the Grade 6 NS-TECH lesson

4.9.4 Classroom Interaction

Badie (2023) Classroom interaction is a core element of teaching and learning, particularly in NS-TECH lessons taught through ESL. It is an exchange of information between educators and learners and amongst the learners themselves, which shape how knowledge is formed, shared and understood by learners. These interactions are crucial for facilitating effective teaching and learning, as they help to engage learners, enhance understanding and improve the NS-TECH educational outcomes. The observations indicated that the verbal interactions between the learners and educators were good when the language used was in the home language rather than the English language. It was also revealed during the observations that learner–learner

interactions were effective during group discussions and collaborative NS-TECH experiments. Two classrooms that were observed were overcrowded and the interaction was limited. Learners did not interact independently as groups due to the limited space. It was also difficult for the educator to have small group interactions.

The photo below shows how the classroom was overcrowded at one of the participating schools



Figure 4.2: Overcrowded Grade 6 classroom at one of the participating schools

4.9.5 Assessment

According to Quynh et al. (2022), assessment is a continuous process that involves evaluating learners' competencies throughout the learning process. It is crucial for ongoing feedback to learners and educators. Assessment in NS-TECH must indicate whether learners are being assessed on their science knowledge rather than being unfairly penalised for weak English skills. The observation was based on various alternative methods of assessment that allow learners to demonstrate NS-TECH understanding beyond the English language. The observations indicated that the

sampled educators used project-based, written tasks and verbal assessments during lessons. Learners participated more during the project-based assessment where they were doing activities practically. Verbal questions were asked during the lessons to check the understanding of learners. However, very few learners responded as most learners were unable to express themselves in English. Project-based assessment supports inquiry and language development but there was a shortage of resources.

4.9.6 Teaching and Learning Resources

Duterte and Llorente (2025) highlighted that teaching and learning resources play a crucial role in NS-TECH lessons for ESL learners by facilitating translanguaging practices. These resources should be supporting learners in using their home languages alongside English, enhancing their conceptual understanding and engagement. Observing the use of teaching and learning resources in NS-TECH lessons, is essential because the resources serve as a bridge between abstract concepts and the ability to understand in unfamiliar language. During the observation, educators used textbooks, which were in English and educators needed to adapt and translate the content. During the observation, educators used visual aids, digital tools and practical equipment to mediate the NS-TECH content. The integration of digital tools and electronic simulations during the lessons impressed learners and made them participate actively during the lesson. The photo below, indicates the integration of digital tools during observation.



Figure 4.3: Integration of Digital tools in teaching and learning by the NS-TECH educator at one of the participating schools

4.9.7 Summary of Classroom Observations

This section outlined the interpretation of classroom observations under the following themes: language use and support; teaching strategies and methods; learner participation; classroom interaction; assessment; teaching and learning resources. Based on the observations conducted, it can be deduced that NS-TECH in Grade 6, was taught through ESL, alongside the home language of learners. The educators used different teaching methods, visual aids and allowed classroom interactions as a way of ensuring that learners do understand the NS-TECH concepts. Furthermore, classroom observations indicated that schools lacked resources that were aligned to bilingual NS-TECH education, to accommodate learners who were ESL speakers. The photos below indicate how one educator used NS-TECH apparatus or equipment during the lesson. The learners at that school were active and discussed what they

were seeing during the colour changes when they were testing glucose and starch. Learners used their own home languages during the discussions and participation.

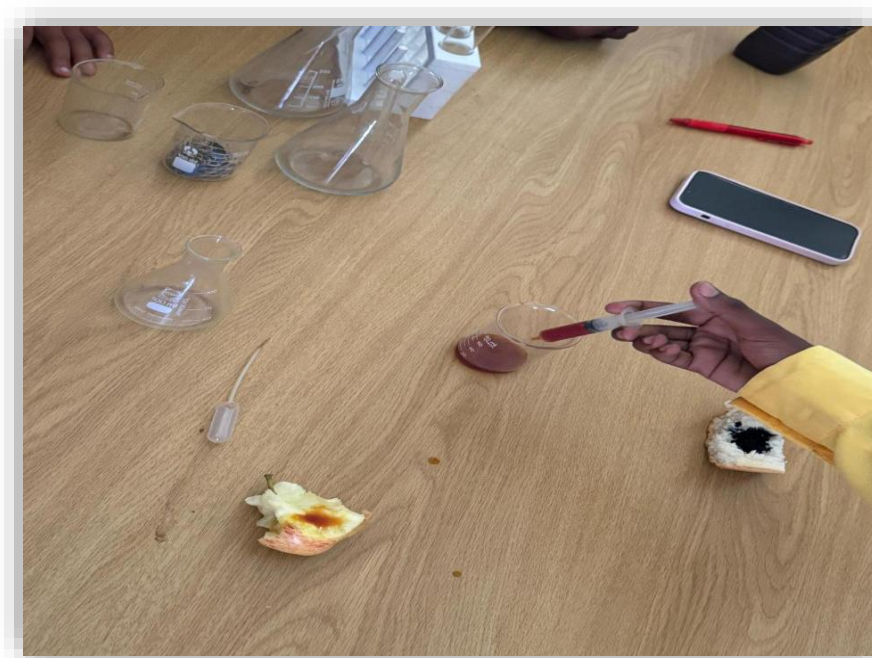


Figure 4.4: Observation of a practical lesson at one of the participating schools

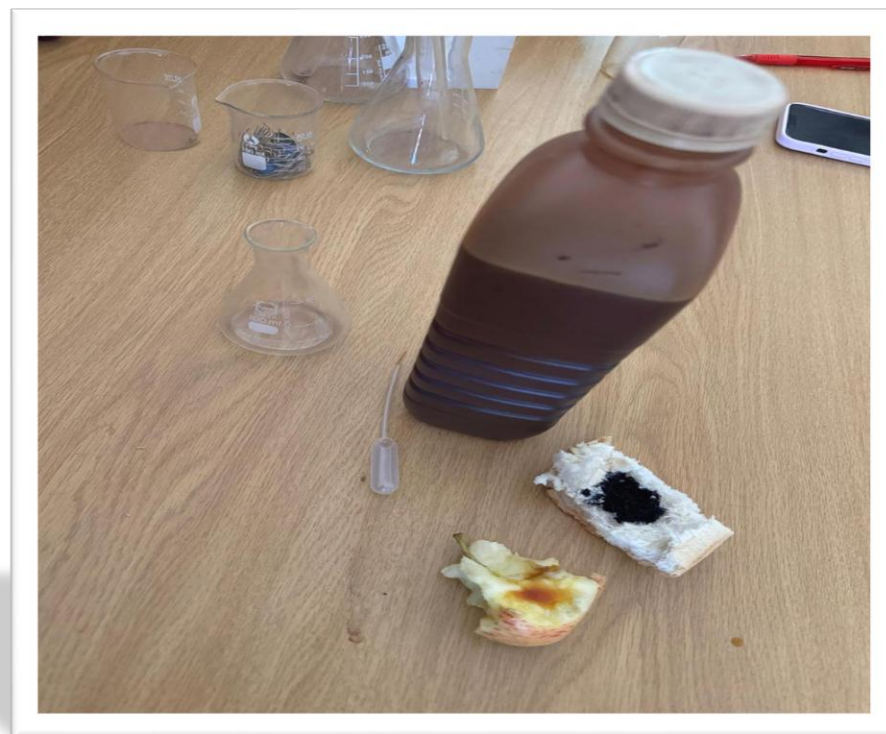


Figure 4.5: Some of the resources used in a practical lesson during observation

4.9 CHALLENGES OBSERVED DURING THE LESSON OBSERVATIONS

The photograph below shows an overcrowded classroom at one of the participating schools.



Figure 4.6: Overcrowded grade 6 classroom at one of the participating schools

There were 62 learners in one classroom, which made it difficult for the educator to arrange learners in groups for discussions and peer learning. It was also difficult for the educator to move between tables for individual learner attention and to maximise participation among learners. The situation at the school made it more difficult for learners to grasp NS-TECH concepts in English. Educator workload was also a challenge at the school regarding marking and maintaining discipline during teaching and learning (Pedaste et al., 2021). Science Labs are crucial in developing critical

scientific skills such as observation, measurement, data collection and analysis. These skills are needed for conducting scientific investigations and are foundational for future scientific projects. All the four schools that were observed did not have functional science labs, where NS-TECH should be taught the concepts and be experimented. Lessons were conducted in ordinary classrooms without access to Lab equipment. Only one school had a few of science equipment, which was stored in the library. Educators relied on chalkboard, textbooks explanations and verbal descriptions. Learners struggled to grasp abstract NS-TECH concepts without practical experiments. English terminology was even harder to internalise without hands-on experience, as a result most of the learners had reduced motivation and participation compared to the school that presented a practical lesson. The photo below indicates the lack of science labs for practical investigations to mediate the NS-TECH English terminology.



Figure 4.7: NS-TECH equipment stored on library shelves with reading books



Figure 4.8: NS-TECH equipment stored on library shelves with reading books

4.10 DATA INTERPRETATION FROM DOCUMENT ANALYSIS

According to Motlhabane (2023), document analysis in the context of NS-TECH subject, refers to a systematic examination of existing documents such as NS-TECH CAPS, textbooks, lesson plans and preparations, teaching aids and assessment records. In this study, the document analysis process was used to triangulate the findings from the data collected through the interviews and observations that provided insight into the teaching of NS-TECH in Grade 6 through ESL. The process of document analysis in this study, involved the following sub-processes: interpretation of lesson plans and preparation, teaching materials, assessment records and CAPS documents.

4.10.1 Analysis of Lesson Plans and Preparation Documents

This process aimed to understand how NS-TECH educators planned and prepared lessons to support concept comprehension through ESL, enhance learner participation and communication, and use strategies to bridge language gaps while learners acquired subject knowledge. All the lesson plan documents from the participating schools, were analysed and had objectives that focused mainly on the NS-TECH content, with little emphasis on the language development, whereas the lesson plans need to focus on both the NS-TECH mastery of concepts and English language acquisition. The teaching strategies that were indicated on the lesson plans were more on talk and chalk methods due to the lack of practical equipment and labs.

NATURAL SCIENCES AND TECHNOLOGY: LESSON PLAN				GRADE 6 STRAND: LIFE & LIVING TERM 1	
PERIOD/DURATION: 30 MINUTES CAPS INTERMEDIATE PHASE					
DATE: 04-02-2025		OBJECTIVES: LEARNERS MUST BE ABLE TO:			
TOPIC: NUTRIENTS IN FOOD		- Identify different foods containing proteins. - Identify different foods with different nutrients.			
Subtopic: Proteins					
Terminology	Proteins				
SPECIFIC AIMS	1. DOING SCIENCE				
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS				
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE				
PROCESS SKILLS					
Accessing & recalling Information	✓	Identifying problems & issues	✓	Doing Investigations	
Observing		Raising Questions	✓	Recording Information	
Comparing	✓	Predicting		Interpreting Information	
Measuring		Hypothesizing		Communicating	✓
Sorting & Classifying	✓	Planning Investigations			
CONTENT		TEACHING & LEARNING ACTIVITIES			Resources
- Living organisms need proteins to build and repair their bodies and for growth. - Proteins also help your immune system fight off infection. - Immune system protects the body from sickness and helps you get better if you have sick. - Protein also makes up part of the red blood cells, which are responsible for carrying oxygen from lungs to the rest of your		The teacher explain the importance of the proteins in the body. The teacher ask learners to make a list of the foods containing protein that they may consume on a daily / weekly basis. They can work in pairs (or in groups) Allow the learners 5 to 7 minutes to complete this activity in their notebooks with revision / corrections / done as a class discussion. Ask them to compare the food containing carbohydrates (from previous lesson) and protein. Further discussion about the function and importance of the protein in our body.			Chalkboard/White board Sasol Inzalo Book Charts Learner Textbook

Figure 4.9: A copy of a Lesson Plan

4.10.2 Analysis of Teaching Materials Documents

The teaching materials documents were analysed to verify their relevance in supporting the ESL learners and the integration of such documents into the actual lessons. The documents included worksheets, textbooks, visual charts, and bilingual glossaries of words for Grade 6 NS-TECH. informal tasks, tests, and practical tasks. The moderation reports were also verified to investigate the principles of assessment and to determine whether the assessments were fair, valid, and consistent. The picture below indicates some of the English-based textbooks and worksheets that were used

by both learners and the educator. Both the LTSMs were aligned to CAPS. However, they were compiled in English, and it was found during the observation that a significant number of learners were unable to read independently with understanding. Learners from the two schools that were observed, had a glossary of terminology to mediate the English language, and for the NS-TECH terminology to be meaningful. The moderation reports from the participating schools revealed that the tasks administered in 2025 were of acceptable quality and assessment was fair and valid for NS-TECH Grade 6 learners. Some of the documents that were verified during the observation are indicated below.

CRITERIA FOR MODERATION				
PART A: TECHNICAL CRITERIA AND INTERNAL MODERATION				
CRITERION 1: TECHNICAL CRITERIA				
Quality Indicators	Y	N	N/A	Reason(s) for non-compliance
1.1 The test is complete with analysis grid(s), marking guideline, relevant answer sheets and formula sheets/addenda.		X		Analysis grid must be attached.
1.2 All relevant details such as name of the subject, time allocation, total number of marks, number of pages and instructions to candidates are included on the test.	X			
1.3 The instructions to candidates are complete, clear and unambiguous.	X			
1.4 The layout of the test is uncluttered and reader-friendly.		X		Please refer to the NSTECH handbook.
1.5 The questions are correctly numbered.		X		
1.6 The pages are correctly numbered.		X		
1.7 The headers and footers on each page are consistent and adhere to the required format.	X			
1.8 Appropriate fonts are used throughout the test.	X			
1.9 Mark allocations for each (sub-) question are clearly shown.	X			
1.10 The test can be completed in the given time.		X		Time not allocated.
1.11 The text, drawings, illustrations, graphs, tables, etc. used are appropriate, clear, legible, error-free and print ready.	X			
Quality Indicators	Y	N	N/A	Reason(s) for non-compliance
1.12 The test adheres to the format requirements in the Curriculum and Assessment Policy Statement (CAPS) and/or Examination Guideline and/or other applicable assessment frameworks.		X		Refer to the NSTECH hand book.

Figure 3: A copy of NS-TECH moderation report



Figure 4.11: Grade 6 NS-TECH Textbooks, which are used by learners at one participating school

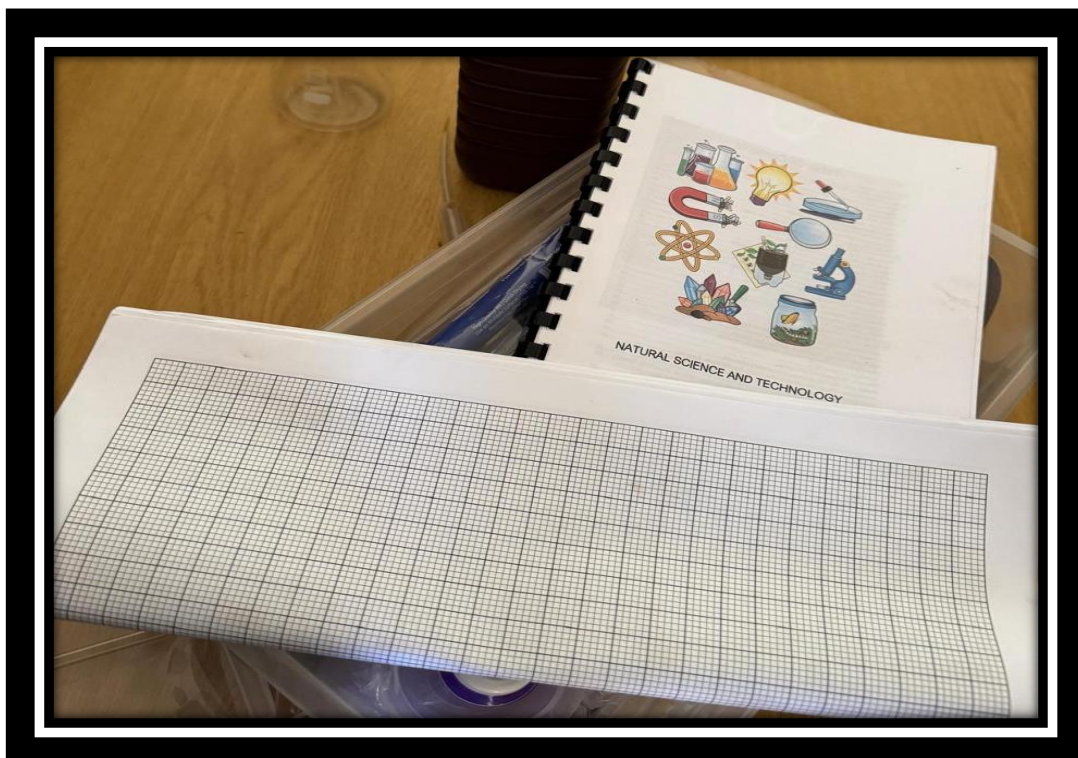


Figure 4.12: Grade 6 NS-TECH Worksheets that were analysed during the observation

4.10.4 Analysis of learner attendance and academic performance documents

The researcher reviewed documents including daily class attendance registers for Terms 1 and 2 of the 2025 academic year. Although not all four schools registered 100% attendance, the average attendance at all four schools was at 98%, which was a good learner attendance and indicated that the Grade 6 learners had attended the NS-TECH lessons according to the time allocation. The academic performance analysis documents revealed how learners performed in NS-TECH, as indicated below.

Table 4.9: Promotion by Grade-Grade 6 NS-TECH, Rekopantswe Circuit, Term 4 (2023-2025)

GRADE 6 NS-TECH PASS PERCENTAGES 2023-2025				
YEAR	SCHOOL P	SCHOOL Q	SCHOOL M	SCHOOL B
2023	69%	72%	64%	74%
2024	71%	76%	70%	72%
2025	70%	74%	68%	72%

Assessment records of NS-TECH from all four participating schools were perused to check the performance of the subject according to the tasks administered per term. The analysis of the assessment records revealed that educators who used practical method of teaching, visual aids and peer teaching strategies to mitigate the difficulties of English as MOI, registered high pass rate. School B in the above table indicates higher level of achievement, due to the practical method, usage of digital tools and peer group strategies, which the educator has implemented. The document below is an extract from the assessment records that were analysed for performance, from one of the participating schools. The recording sheets indicated the forms of assessment related NS-TECH.

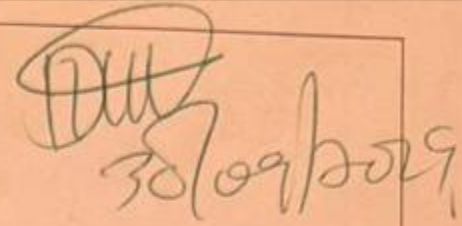
06)	TASKS	TASK 5: Prac Task/ Investigation	TASK 6: Test				
	Activities						
	Weighting	40	60				
	Total Mark	2015	5020	= 70			
Include in SBA Year Mark	Yes	Yes	Yes	TOTAL Weighted Mark	Term %	Level	Report Term
Term /Date	Term3 2025/09/15	Term3 2025/09/16					
Gender	T1	T2			100		
Male	11	42	53	76	6		
Male	10	31	41	58	4		
Female	11	23	34	45	3		
Female	11	40	51	73	6		
Male	10	40	50	71	6		
Male	12	38	50	71	6		
Female	12	39	50	71	6		
Female	12	29	41	58	4		
Female	12	36	48	69	5		
Male	14	44	38	53	7		
Male	10	18	28	40	3		
Male	20	34	34	77	6		
Male	11	20	31	44	3		
Male	10	37	47	67	5		
Female	10	41	51	73	6		
Male	11	38	49	70	6		
Female	12	24	36	52	4		
Male	11	27	48	69	5		
Female	12	29	51	73	6		
Male	10	40	50	71	6		

Figure 4.13: a copy of Grade 6 NS-TECH recording sheet

The learner attendance registers were perused at the participating schools, and attendance analysis was found to be at 98%, which was a good attendance. The photo below indicates an extract of the attendance register from one of the participating schools.

4.10.5 Analysis of NS-TECH CAPS Documents

This was done to examine the implementation of NS-TECH CAPS documents and how they were aligned to the classroom realities, where the Grade 6 learners were taught in ESL. All the sampled schools followed NS-TECH CAPS, and the time

allocation in all the sampled schools for NS-TECH was CAPS-compliant. However, all the educators struggled with content coverage as per the time allocation, due to the additional support needed by learners regarding the English language challenges.

The photo below indicates an extract from the Grade 6 NS-TECH CAPS document, timetable, and lesson plan, which were analysed for implementation. The lesson plans and timetables were all aligned to the CAPS document.

GRADE 6 TERM 4				
STRANDS: NATURAL SCIENCES: PLANET EARTH & BEYOND TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	Topic	Content & Concepts	Suggested Activities: Investigations, practical work, and demonstrations	
1 week (3 ½ hours)	Movements**** of the Earth and planets	Rotation (Earth) - in our Solar System, each planet rotates (spins) on its own axis - the planet Earth is spinning, and one complete rotation takes about 24 hours. We experience this as a day and a night - during rotation the side of the Earth facing the Sun experiences daytime, and the opposite side of the Earth experiences night-time Revolution (Earth) - all planets also revolve (travel) around the Sun in their own orbits - planet Earth revolves around the Sun in its own orbit (pathway), and one complete revolution takes 365 ¼ days. We experience this as a year	- demonstrating the movements (rotation and revolution) and of the Earth using models and body movements - demonstrating how day and night occur using a model of the Earth and a light source (for the Sun) - drawing and writing about the rotation of the Earth in relation to the Sun - how day and night occur	Models and a light source such as torch, lamp, or candle to demonstrate the movements of the Earth
Notes: **** Video clips could be used to help clarify the movements of the planets				

Figure 4.15: Department of Basic Education. (2011). Curriculum and Assessment Policy Statement (CAPS): Natural Sciences and Technology – Intermediate Phase. Pretoria: Government Printers

THURSDAY													
TIME	7H30 8H00	8H00 8H30	8H30 9H00	9H00 9H30	9H30 10H15	10H15 10H45	10H45 11H15	11H15 11H45	11H45 12H15	12H15 12H45	12H45 13H15	13H15 13H45	13H45 14H15
4A	LIFE SKILLS MLAMLA	LIFE SKILLS MLAMLA	NS TECH MASEDA	NS TECH MASEDA	B R E A K	SETSWANA HL PHASWANA	SETSWANA HL PHASWANA	SETSWANA HL PHASWANA	MATHS DIKWAYO	MATHS DIKWAYO	EFAL MLAMLA	EFAL MLAMLA	READING
4B	SETSWANA HL PHASWANA	SETSWANA HL PHASWANA	EFAL MLAMLA	EFAL MLAMLA		MATHS MASEDA	MATHS MASEDA	MATHS MASEDA	LIFE SKILLS MLAMLA	LIFE SKILLS MLAMLA	NS TECH MASEDA	SS MAHALEFA	READING
5A	SETSWANA HL MOTALANE	SETSWANA HL MOTALANE	SETSWANA HL MOTALANE	EFAL MOLEFE		EFAL MOLEFE	MATHS KEKANA	MATHS KEKANA	MATHS KEKANA	SS MSIMANG	SS MSIMANG	LIFE SKILLS SHEELA	READING
5B	NS TECH MSIMANG	NS TECH MSIMANG	SS MSIMANG	SETSWANA HL MOTALANE		SETSWANA HL MOTALANE	SETSWANA HL MOTALANE	LIFE SKILL MOTALANE	EFAL MOLEFE	EFAL MOLEFE	MATHS KEKANA	MATHS KEKANA	READING
6A	MATHS DIKWAYO	MATHS DIKWAYO	SETSWANA HL SHEELA	SETSWANA HL SHEELA		SETSWANA HL SHEELA	LIFE SKILLS SHEELA	EFAL RAMATJELA	EFAL RAMATJELA	NS TECH MOLATE	NS TECH MOLATE	SS BALOVI	READING
6B	NS TECH MMEKWA	NS TECH MMEKWA	LIFE SKILLS MOLEFE	LIFE SKILLS MOLEFE		EFAL RAMATJELA	EFAL RAMATJELA	MATHS MMEKWA	MATHS MMEKWA	SETSWANA HL SHEELA	SETSWANA HL SHEELA	SETSWANA HL SHEELA	READING
7A	NS MPETE	SETSWANA HL MPETE	SETSWANA HL MPETE	TECHNOLO RAMATJELA		MATHS MOLATE	MATHS MOLATE	CA PHASWANA	CA PHASWANA	EFAL BALOVI	EFAL BALOVI	EMS MMEKWA	READING
7B	MATHS MOLATE	MATHS MOLATE	EFAL BALOVI	EFAL BALOVI		SETSWANA HL MAHALEFA	SETSWANA HL MAHALEFA	NS MOLATE	NS MOLATE	EMS MMEKWA	EMS MMEKWA	SS DEANE	READING

Figure 4.16: A copy of a timetable indicating the NS-TECH time allocation according to CAPS

NATURAL SCIENCES AND TECHNOLOGY: LESSON PLAN
 PERIOD/DURATION: 30 MINUTES
 CAPS INTERMEDIATE PHASE

GRADE 6
STRAND: LIFE & LIVING
TERM 1

DATE: 04-02-2025		OBJECTIVES: LEARNERS MUST BE ABLE TO:				
TOPIC: NUTRIENTS IN FOOD		- Identify different foods containing proteins. - Identify different foods with different nutrients.				
Subtopic: Proteins						
Terminology	Proteins					
SPECIFIC AIMS	1. DOING SCIENCE					
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS					
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE					
PROCESS SKILLS						
	Accessing & recalling Information	✓	Identifying problems & issues	✓	Doing Investigations	
	Observing		Raising Questions	✓	Recording Information	
	Comparing	✓	Predicting		Interpreting Information	
	Measuring		Hypothesizing		Communicating	✓
	Sorting & Classifying	✓	Planning Investigations			

CONTENT	TEACHING & LEARNING ACTIVITIES	Resources
- Living organisms need proteins to build and repair their bodies and for growth. - Proteins also help your immune system fight off infection. - Immune system protects the body from sickness and helps you get better if you have sick. - Protein also makes up part of the red blood cells, which are responsible for carrying oxygen from lungs to the rest of your	The teacher explain the importance of the proteins in the body. The teacher ask learners to make a list of the foods containing protein that they may consume on a daily / weekly basis. They can work in pairs (or in groups) Allow the learners 5 to 7 minutes to complete this activity in their notebooks with revision / corrections / done as a class discussion. Ask them to compare the food containing carbohydrates (from previous lesson) and protein. Further discussion about the function and importance of the protein in our body.	Chalkboard/White board Sasol Inzalo Book Charts Learner Textbook

Figure 4.17: A copy of a Grade 6 Lesson Plan

4.10.6 Summary of Document Analysis

This section presented document analysis of lesson planning and preparations, teaching materials, assessment records and CAPS documents. The main purpose was to examine how official guidelines, lesson planning and assessment practices align to classroom realities.

By analysing these documents, the study was able to triangulate the findings from the interviews and observations, thereby enhancing the understanding of the challenges and strategies involved in the teaching of NS-TECH in multilingual contexts.

4.11 SUMMARY OF THE CHAPTER

Educators reported that most learners are continuously struggling to grasp scientific concepts due to limited proficiency in English. The challenge is common in multilingual classrooms and more significant in NS-TECH, as learners must master both scientific concepts and the English Second language simultaneously. The over-reliance by educators on code switching indicates that educators 'attempts at mediation and consistent with Vygotsky's view that language is a cultural tool for accessing knowledge. Since South Africa has limited resources for effective teaching and learning, educators improvise by drawing on multilingual practices, which are aligned with translanguaging literature Prilutskaya (2021)

The findings are aligned with Shubani and Mavuru (2022), who argue that English proficiency directly shapes science comprehension. However, this study expands this by showing how socio-economic realities on the ground worsen the language barriers in South Africa, particularly in rural classrooms. Educators highlighted overcrowded classrooms as one barrier; the deeper issues lie in how such conditions limit opportunities for scaffolding within learners' ZPD. This finding advocates the need for smaller class sizes to enable individual learner support.

The main concentration of this chapter was based on data presentations and interpretations. Data was presented according to the responses of the participants, which were collected through the interviews, observations, and document reviews. The findings showed that there were significant factors that contributed to the unsuccessful implementation of the NS-TECH curriculum through ESL. The findings indicated that ESL created a barrier that hindered comprehension of NS-TECH

concepts, limited bilingual resources, and reduced learner confidence related to systemic inequities in assessment and support. The findings further indicated that learners struggled to grasp concepts when taught in English, especially if the terminology was unfamiliar to them.

The data indicated that learners lost confidence, participated less in class discussions and involved themselves in memorisation of terminologies, rather than a deep understanding of concepts. It was further revealed in this chapter that NS-TECH had few bilingual or multilingual teaching materials, which educators needed to support the teaching and learning of NS-TECH in a multilingual context like the Rekopantswe Circuit, where the study was conducted. The next chapter concludes the study by presenting a summary of the findings and recommendations.

The findings indicated that language barriers, code switching, and resource constraints are not separate challenges but interrelated and clearly explained through Sociocultural Theory. ZPD explains the need for scaffolding in English medium NS-TECH instruction, mediation highlights the strategies that educators could employ to mediate language gaps, and cultural tools give clarity on the role of multilingual practices and resources in effective teaching and learning. The chapter described how educators overcome the challenges of teaching NS-TECH in ESL in the rural Rekopantswe Circuit.

CHAPTER 5: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The purpose of this study was to explore the experiences of educators in teaching Grade 6 NS-TECH, through English second language, at the rural area of Rekopantswe circuit, Bojanala District. Eight educators from four different primary schools in Rekopantswe circuit were sampled as participants of the study, based on the inclusion criteria mentioned in Chapter 3. In Chapter 4, data was collected through semi-structured interviews, lesson observation, and supported by document analysis.

This Chapter also presents a combination of the research findings, draws conclusions aligned with the research study's objectives, and offers recommendations for teaching methodologies, policy guidelines, and further research. The study explored the

experiences of educators in teaching Grade 6 NS-TECH through English as a second language. The focus was on the challenges, methodology adaptations, and systemic support in multilingual contexts such as the Rekopantswe circuit.

Main Research Question:

- What are the experiences of Grade 6 educators in the teaching and learning of Natural Science and Technology (NS-TECH), through the English medium in Rekopantswe Circuit?

Sub-questions

- What challenges do Grade 6 educators face when teaching Natural Sciences and Technology (NS-TECH) through the English medium?
- How does the use of English as the language of teaching and learning impact the teaching strategies employed by Grade 6 educators?
- What are the perceptions of Grade 6 educators regarding learners' understanding and engagement in Natural Sciences and Technology (NS-TECH) taught through English?
- What support do Grade 6 educators receive from school management and district officials to address language-related challenges in teaching Natural Sciences and Technology (NS-TECH)?
- What strategies do Grade 6 educators use to overcome language barriers in teaching Natural Sciences and Technology (NS-TECH)?

5.2 OVERVIEW OF THE CHAPTERS

The main concepts that were dealt with in the chapters of this study, are explained in detail in this chapter. These concepts are inclusive of the introduction and background of the study, the reviewed literature including the contextual, conceptual and theoretical framework in which the study was guided, the research methodology and design as well as the findings.

5.2.1 Chapter 1 (Orientation of the Study)

The introduction and background of the study were explained in this chapter. The problem statement, the main research question and the sub-questions linked to the

research objectives and the main purpose of the study, were highlighted. Chapter 1 also covered the theoretical framework, on which the research study was based. The preliminary literature review was presented, with the inclusion of research methodology and design of the study. It also addressed trustworthiness, ethical considerations, limitations and delimitations.

5.2.2 Chapter 2 (Theoretical Framework and Literature Review)

The chapter provided the theoretical foundation for this study and related implications. This was followed by the literature relevant to the study, which focused on accounts of educators who were teaching NS-TECH through English, within an ESL context. Furthermore, Chapter 2 dealt with the theoretical framework, which was derived from Lev Vygotsky's sociocultural theory and formed the basis of this study. The sociocultural theoretical framework provided a foundation for researching the experiences of educators, when interacting with the Grade 6 learners in the NS-TECH class, taught in ESL. This chapter presented a critical review of existing literature on challenges faced by educators and learners in teaching and learning NS-TECH through ESL.

The review covered European countries, African countries and the South African context. Acts and policies impacting on language of instruction in the South African context were covered in this chapter. Furthermore, the chapter highlighted some of the challenges faced by educators, when teaching through English as the language of teaching and learning.

5.2.3 Chapter 3 (Research Methodology and Design)

This chapter provided an in-depth overview of the research methodology and design used in the study. The research site, context, approach, paradigm, and design were clearly explained in this chapter. Furthermore, there was a discussion on research methods focusing on the selection of participants and data collection techniques used in the study. The measures for maintaining trustworthiness of qualitative data and the ethical considerations that the researcher adhered to in conducting the study were also presented in this chapter.

5.2.4 Chapter 4 (Data Presentation and Discussion)

This chapter articulated and analysed the findings of the study derived from the collected data, which was informed by the research questions presented in the study. The data presented in Chapter 4 was obtained through interviews, observations and document analysis which served as the primary instruments for data collection. To uphold the principle of anonymity and in consideration of ethical standards, this chapter used codes that functioned as pseudonyms. The data was collected from eight educators who came from four primary schools in Rekopantswe circuit. Five main themes were identified as discussed in the following section.

5.3 SUMMARY OF THE RESEARCH FINDINGS

This section presents a comprehensive summary of the research outcomes pertaining to the data obtained, which has been aligned to the reviewed literature. The main results were presented in alignment with the following five key themes.

- Theme 1 – challenges that Grade 6 educators face when teaching Natural Sciences and Technology (NS-TECH) through the English medium;
- Theme 2 – the effects of teaching NS-TECH through English second language, as the language of teaching and learning;
- Theme 3 – how Grade 6 learners learn, when taught NS-TECH in English second language;
- Theme 4 – strategies to improve the teaching of NS-TECH Grade 6 in English second language; and
- Theme 5 – ways on how the district officials and school management could support the NS-TECH Grade 6 educators, in their teaching through English second language.

Data aligned to themes are summarised below.

5.3.1 Theme 1: The Challenges that Grade 6 Educators Face when Teaching Natural Sciences and Technology (NS-TECH) through the English medium

This theme was about the challenges that were encountered by educators when teaching NS-TECH in English. The participants indicated the difficulties experienced by both the educators and learners during the NS-TECH lessons. The responses

showed that the challenges were categorised into pedagogy, linguistic, and systemic challenges. Learners struggled with comprehension of scientific terminology, leading to reliance on memorisation rather than conceptual understanding. It was also found that language barriers reduced learner confidence, limited participation, and contributed to misconceptions of scientific and technological concepts.

5.3.1.1 Sub-theme 1: Language and communication challenges

The findings indicated that when teaching NS-TECH in English, educators encountered the following challenges regarding language and communication. Learners' limited English skills affected their understanding of scientific and technological concepts. Educators had difficulty in explaining and defining new NS-TECH terms in simple English for the Grade 6 learners to understand. There was an over-reliance on code-switching which impacted negatively on the contact time and ultimately on content coverage and learning outcomes.

5.3.1.2 Sub-theme 2: Difficulty in relevant and adapted teaching strategies

According to the data, there should be a balance between the curriculum demands and learners' language levels. The findings indicated that there were difficulties in teaching practical experiments and scientific inquiry through English. Most learners found it difficult to follow the instructions to perform an experiment, which had been taught in English. Educators struggled to tailor their teaching strategies to integrate language support with NS-TECH teaching and learning.

5.3.1.3 Sub-theme 3: Limited learner participation and engagement

The findings revealed that there was reduced learner confidence and little participation in class discussions when they were conducted in English. Learners were afraid to express their ideas and were reluctant to communicate in class during NS-TECH group discussions.

5.3.1.4 Sub-theme 4: Material and resource constraints

The findings revealed that there was a shortage of NS-TECH teaching and learning resources and textbooks in the learners' home languages. There was an over-reliance on English-only textbooks, which most learners could not read with meaning. There

was limited use of visual, practical, and multilingual resources to support the comprehension of NS-TECH concepts, content, and skills.

5.3.2 Theme 2: The Effects of Teaching NS-TECH Through English as the language of teaching and learning

According to the responses by participants under Theme 2, teaching NS-TECH through English as a second language shaped learning at three interconnected levels, i.e., learners, educators, and the system itself. The participants' responses indicated that the learners they taught experienced difficulties when it came to comprehension, active participation, engagement and performance.

Their responses also highlighted that educator pedagogy had to be adapted from time to time to suit the language development of the Grade 6 learners and the system, which was not responsive in terms of relevant teaching and learning resources. Some of the systemic challenges analysed were that schools lacked bilingual or multilingual teaching materials tailored to NS-TECH. Limited resources hindered inclusive education practices and assessment practices often failed to accommodate linguistic diversity, reinforcing inequities amongst learners.

5.3.2.1 Sub-theme 1: Learner effects – Comprehension and conceptual understanding

The findings indicated that the most Grade 6 learners misunderstood NS-TECH concepts. The findings further indicated that learners at their schools have difficulty in understanding abstract terms, particularly Term 4 Planet Earth and Beyond concepts. This reduced problem-solving ability amongst learners due to low confidence in English class discussions and reluctance to collaborate in English.

5.3.2.2 Sub-theme 2: Educator related effects

As per the analysis, educators were affected in the sense that they had to make pedagogical adaptations to support language development amongst learners by applying code-switching practices, simplification of NS-TECH terminology, use of visual teaching aids and real-life objects. The NS-TECH educators had a challenge in balancing the curriculum coverage as prescribed by CAPS and language support.

5.3.2.3 Sub-theme 3: Systemic effects

The findings indicated that the textbooks were only available in English and did not cater for the learners' different home languages, predominantly Setswana in Rekopantswe Circuit. The participants further indicated that the lack of multilingual teaching aids exacerbated the challenge of not understanding the NS-TECH concepts in English. Policy context was also mentioned as one of the systemic effects, where policy dictated that NS-TECH in Grade 6 must be taught in English as the language of teaching and learning.

5.3.3 Theme 3: To Establish Ways in Which the Grade 6 Learners Learn, When Taught NS-TECH in English Second Language

The analysis revealed that learning depended on how learners constructed understanding of scientific and technological concepts, often relying on memorisation, translation and visual aids, while language barriers contributed to misconceptions and limited deeper reasoning. Peer support, cooperative learning and code-switching emerged as effective mechanisms to bridge the linguistic gaps.

5.3.4 Theme 4: To Develop Strategies to Improve the Teaching of NS-TECH Grade 6 in English Second Language

The reviewed objective and sub-themes demonstrated that improving the teaching of NS-TECH Grade 6 through ESL requires an integrated approach. Language support, method adaptation, valid and fair assessment, relevant resources and a learner-centred approach must work together to ensure that language works as a bridge rather than as a barrier to scientific knowledge. All these factors play a crucial role in the promotion of equity, inclusion and meaningful learning outcomes in NS-TECH Grade 6 classroom.

5.3.4.1 Sub-theme 1: Language support strategies

The findings indicated that educators used different approaches when teaching NS-TECH, with the purpose of simplifying and scaffolding scientific terms. The findings further indicated the effective use of code-switching and translanguaging in NS-TECH classrooms, which assisted learners in developing a deeper understanding of concepts presented in English. The analysis revealed that learners were supported by

NS-TECH educators to use a bilingual glossary of words as a strategy for teaching and learning, coupled with visuals and real-life objects to mediate the teaching of NS-TECH.

5.3.4.2 Sub-theme 2: Teaching methods and strategies

The findings revealed that the teaching approaches and strategies were crucial for ESL learners but were taught NS-TECH through English. Some of the strategies used were experimental and group discussion methods. Educators indicated that they used differentiated methods of teaching to cater for the different levels of English proficiency amongst learners.

5.3.4.3 Sub-theme 3: Assessment and feedback methods

The findings aligned to assessment confirmed that NS-TECH educators designed assessment tests which assessed scientific knowledge rather than English language competency. The findings further confirmed the use of alternative forms of assessment like projects and practical work, rather than being over-reliant on written tests. It was further revealed that NS-TECH educators provided constructive feedback to learners, that supported both the language development and content.

5.3.4.4 Sub-Theme 4: Learning and teaching support material (LTSM) selection, development and use

The findings revealed that LTSM were crucial for learners to understand NS-TECH content and concepts. The creation of multilingual resources and visual aids was beneficial to the learners who learned through ESL. The use of digital tools and interactive simulations assisted learners to overcome the English language barriers and grasp the NS-TECH concepts deeper. The English NS-TECH textbooks should be adapted to accommodate the home languages of the Grade 6 learners.

5.3.4.5 Sub-Theme 5: Learner-centred strategies

The literature review revealed that when learners engaged in collaborative learning and problem-solving, their confidence and independence grew, leading to academic performance, Gyeltshen (2025). The findings confirmed the importance of integrating active, inquiry-based strategies that place learners at the centre of their learning, thereby creating a more engaging and effective science learning environment. The

findings confirmed that a learner-centred approach would be beneficial if implemented by encouraging peer collaboration and cooperative learning during the NS-TECH learning process. The findings further emphasised that through learner-centred approach, learners became independent and critical thinkers, who created meaningful learning on their own.

5.3.5 Theme 5: To Establish Ways on How the District Officials and School Management Could Support the NS-TECH Grade 6 Educators, in Their Teaching through English Second Language

The reviewed objective and sub-themes on the establishment on how the District Officials and School Management could support the NS-TECH Grade 6 educators in their teaching through ESL. The interviews demonstrated that their various strategies were implemented by both the SMTs and district officials for effective support of NS-TECH Grade 6 educators. These strategies focused on methodologies, integrating technology and providing professional development. However, there was still a lack of adapted textbooks to support learners in their home languages.

5.4 RECOMMENDATIONS

This section presents the recommendations based the research question and sub-questions, the findings presented in themes as well as the reviewed literature. These recommendations address the underlying problems causing an academic achievement gap in Grade 6 NS-TECH. The recommendations are made for Grade 6 NS-TECH educators, SMTs, district officials and policymakers.

5.4.1 Recommendations for Grade 6 NS-TECH Educators

Educators are the main implementers of the NS-TECH curriculum in the classroom. They should:

- Apply the integrated language support strategies towards the learners they teach, including code-switching, scaffolding and translanguaging.
- Create collaborative learning environments, where peer support and cooperative tasks help to bridge the linguistic gaps that may be encountered by the NS-TECH learners.

- Prioritise a learner-centred approach that builds confidence and encourages active participation.

5.4.2 Recommendations for School Management Teams (SMTs)

SMTs should:

- Provide ongoing educator professional development opportunities and more focused on bilingual pedagogy and inclusive practices.
- Facilitate access to technology and digital resources that support multilingual learning.
- Advocate for adapted textbooks and teaching materials in learners' home languages.

5.4.3 Recommendations for District Officials and Policymakers

District officials and policymakers should:

- Develop and distribute bilingual NS-TECH resources tailored to rural contexts like Rekopantswe Circuit.
- Align assessment frameworks with linguistic diversity to ensure fairness and equity.
- Invest in educator training programmes that emphasise inclusive education and multilingual pedagogy.
- Address systemic inequalities such as overcrowded classrooms and inadequate resource allocation.

5.5 RECOMMENDATIONS FOR FURTHER RESEARCH

- Future research should examine the impact of bilingual resources in NS-TECH classrooms.
- Further studies should explore innovative pedagogical models that integrate technology with multilingual teaching approaches.
- Additional research should investigate learner outcomes in diverse rural contexts to inform national policy on inclusive science education
- The study contributes to knowledge by extending Sociocultural Theory into science education in multilingual rural contexts. The study demonstrates how ZPD, mediation, and cultural tools explain the educators' strategies in overcoming

language barriers. It is evident in the study that language and socio-economic challenges offer new opportunities into how systemic inequalities shape NS-TECH education.

5.6 CONCLUSION

This study highlighted the urgent need for systemic, pedagogical, and linguistic interventions to ensure that Grade 6 learners in multilingual rural contexts like the Rekopantswe circuit, can access NS-TECH meaningfully. By transforming language from being a barrier into a bridge towards the acquisition of the content, and by equipping educators with the necessary tools and resources, equity and inclusion in science education can be advanced. There is also a call for systemic reforms in language in education policy; there is a need for bilingual NS-TECH resources and continuous professional development amongst educators. The scope of the study is limited, but it advances the knowledge by identifying language challenges within the broader socio-economic realities and provides the basis for inclusive NS-TECH education in the whole of South Africa.

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ANNEXURES

ANNEXURE A: ETHICAL CLEARANCE



College of Education _ERC

Date: 20/11/2025

Dear: Mr Johannes Vusi Mnisi

**Decision: Ethics Approval from
20/11/2025 to 20/11/2028**

NHREC Registration # : (if applicable)
Ref #: 8171
Name: Mr Johannes Vusi Mnisi
Student #: 41419642
Staff #:

Researcher: Mr Johannes Vusi Mnisi

Moretele Department of education

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Supervisor: Dr Patricia Ouma Nomsa Moshaba emoshap@unisa.ac.za

Co-Supervisor: Dr Mapitso Veronica Kgabo veronicakgabo@yahoo.com

Co-Researcher(s):

Email address:

**Experiences of grade six educators in teaching Natural Science and Technology through
English in Rekopantswe circuit**

Qualification: MED (EDUC Management)

Thank you for the application for research ethics approval by the College of Education _ERC for the above-mentioned research study.
Ethics approval is granted for **three years**.

The **low risk application** was **reviewed** by the College of Education _ERC in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.

The proposed research may now commence with the provisions that:

1. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
2. Any adverse circumstance arising during the undertaking of the research study that may affect the ethical integrity of the study, including those involving research participants, third parties, or juristic persons, must be reported in writing to the College of Education _ERC without delay.
3. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.
4. Any changes that may affect study-related risks to research participants, juristic or third persons, must be reported in writing to the College of Education _ERC, accompanied by a progress report.

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5. The researcher will ensure that the research study complies with all applicable national legislation, professional codes of conduct, institutional guidelines, and scientific standards relevant to the specific field of study. Where applicable, adherence to the following South African legislation is essential: the Protection of Personal Information Act (No. 4 of 2013), the Children's Act (No. 38 of 2005), and the National Health Act (No. 61 of 2003)
6. Future use of this research data is permitted only in de-identified form and only for secondary research with objectives similar to those of the original study. Any secondary use involving identifiable human data will require additional ethics clearance.
7. No fieldwork activities may continue beyond the stated expiry date (20/11/2028). A completed Research Ethics Progress Report must be submitted as an application for renewal and is subject to approval by the Research Ethics Committee. A Close-Out Report must be submitted upon completion of the research study.
8. The College of Education _ERC may require the submission of regular progress reports on an **annual** basis, in alignment with Section 7.2 of the Unisa Policy on Research Ethics (2024).

Additional Conditions

1. Disclosure of data to third parties is prohibited without explicit consent from the research participants and Unisa.
2. Research data must be stored in compliance with the university's research data management policy for a period of up to 15 years.

Additional Conditions

1. Disclosure of data to third parties is prohibited without explicit consent from the research participants and Unisa.
2. Research data must be stored in compliance with the university's research data management policy for a period of up to 15 years.
3. When publishing the results, the researcher must take appropriate precautions to safeguard the confidentiality and privacy of the research participants, juristic persons, third parties, and the university, in accordance with institutional policies and ethical standards.
4. Adherence to the National Statement on Ethical Research and Publication Practices, specifically Principle 7 on Social Awareness, must be ensured. This principle states: 'Researchers and institutions must be sensitive to the potential impact of their research on society, marginal groups, or individuals, and must consider these when weighing the benefits of the research against any harmful effects, with a view to minimising or avoiding the latter where possible.' The University of South Africa (Unisa) accepts no liability for any failure to comply with this principle.

Note

The reference number 8171 should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.

Kind regards,



Prof Justin Oswin August
Chair of College of Education _ERC
E-mail: augusjo@unisa.ac.za



ANNEXURE B: REQUEST FOR PERMISSION TO CONDUCT AN EDUCATIONAL RESEARCH IN PUBLIC PRIMARY SCHOOLS IN REKOPANTSWE CIRCUIT.

[DISTRICT DIRECTOR]

[Consent letter]

Re: Request for permission to conduct research in eight primary schools in Bojanala District, Rekopantswe Circuit

Dear Mr/Mrs

Firstly, I would like to express my warm and sincere greetings. My name is Johannes Vusi Mnisi and I am doing a Master's degree in Education at the University of South Africa (UNISA), under the supervision of Dr PON Moshaba and Dr MV Kgabo. I am writing to respectfully request permission to conduct research at your school on the teaching of Natural Sciences and Technology (NSTech) in Grade 6. The focus of this study will be on **the experiences of educators teaching NSTech in English to learners who are not English first language speakers.**

The purpose of this research is to gain deeper insight into how educators navigate the teaching of NSTech in English, particularly in multilingual classrooms like those at your school. By exploring their experiences, challenges, and strategies, the study aims to contribute to both improved teaching practice and broader curriculum development.

The outcomes will be shared with the school and district, ensuring that the research benefits the broader educational community. I assure the District Director that the research will be conducted ethically, with full respect for the school's policies, educators' confidentiality, and learners' wellbeing. Participation will be voluntary, and findings will be reported in a manner that protects the identity of all involved.

I kindly request your approval to proceed with this study. Your support will be invaluable in advancing inclusive and effective teaching practices in NSTech.

Thank you for considering this request. I look forward to your positive response.

Sincerely

Mnisi JV- Researcher



ANNEXURE C: REQUESTING PERMISSION TO CONDUCT AN EDUCATIONAL RESEARCH AT YOUR PRIMARY SCHOOL [SGB]

Re: Request for permission to conduct research at your school.

02 October 2025

The SGB member

School name:

Dear Mr/Mrs

Firstly, I would like to express my warm and sincere greetings. My name is Johannes Vusi Mnisi and I am doing a Master's degree in Education at the University of South Africa (UNISA).

I am writing to respectfully request permission to conduct research at your school on the teaching of Natural Sciences and Technology (NSTech) in Grade 6. The focus of this study will be on the experiences of educators teaching NSTech in English.

The purpose of this research is to gain deeper insight into how educators navigate the teaching of NSTech in English, particularly in multilingual classrooms like those at your school. By exploring their experiences, challenges, and strategies, the study aims to contribute to both improved teaching practice and broader curriculum development.

The outcomes will be shared with the school and district, ensuring that the research benefits the broader educational community.

I assure the SGB that the research will be conducted ethically, with full respect for the school's policies, educators' confidentiality, and learners' wellbeing. Participation will be voluntary, and findings will be reported in a manner that protects the identity of all involved.

I kindly request your approval to proceed with this study. Your support will be invaluable in advancing inclusive and effective teaching practices in NSTech.

Thank you for considering this request. I look forward to your positive response.

Sincerely

Mnisi JV- Researcher



ANNEXURE D: REQUEST FOR PERMISSION FROM SCHOOL PRINCIPALS TO CONDUCT RESEARCH IN THEIR SCHOOLS

06th October 2025

Principal's name: _____

School name: _____

School address: _____

Dear Sir/Madam

Firstly, I would like to express my warm and sincere greetings. My name is Johannes Vusi Mnisi and I am doing a Master's degree in Education at the University of South Africa (UNISA).

I am writing to respectfully request permission to conduct research at your school on the teaching of Natural Sciences and Technology (NSTech) in Grade 6. The focus of this study will be on **the experiences of educators teaching NSTech in English**.

The purpose of this research is to gain deeper insight into how educators navigate the teaching of NSTech in English, particularly in multilingual classrooms like those at your school. By exploring their experiences, challenges, and strategies, the study aims to contribute to both improved teaching practice and broader curriculum development.

The outcomes will be shared with the school and district, ensuring that the research benefits the broader educational community.

I assure the principal and staff that the research will be conducted ethically, with full respect for the school's policies, educators' confidentiality, and learners' wellbeing. Participation will be voluntary, and findings will be reported in a manner that protects the identity of all involved.

I kindly request your approval to proceed with this study. Your support will be invaluable in advancing inclusive and effective teaching practices in NSTech.

Thank you for considering this request. I look forward to your positive response.

Sincerely

Mnisi JV- Researcher



ANNEXURE E: PARTICIPANTS' INFORMATION SHEET

[Consent letter]

06th October 2024

TITLE: Experiences of Grade 6 educators in teaching Natural Science and Technology through English in Rekopantswe circuit.

DEAR PROSPECTIVE PARTICIPANT

Firstly, I would like to express my warm and sincere greetings. My name is Johannes Vusi Mnisi and I am doing a Master's degree in Education at the University of South Africa (UNISA), under the supervision of Dr PON Moshaba and Dr MV Kgabo. We are inviting you to participate in the study entitled: **Experiences of Grade 6 educators in teaching Natural Science and Technology (NS-TECH) through English in Rekopantswe circuit.**

WHAT IS THE PURPOSE OF THE STUDY?

The purpose of this study is to investigate the challenges that educators face in teaching grade 6 NS-TECH in English, in Rekopantswe circuit where learners 'home languages are diverse. The outcomes of the study will be shared with the purpose to improve the teaching strategies in NS-TECH.

WHY AM I BEING INVITED TO PARTICIPATE?

You are being invited to participate in this study because you have rich knowledge and experience teaching either at a rural or urban secondary school. This makes you a suitable candidate for providing valuable insights into understanding the dynamics around teaching NS-TECH in English language, to the grade 6 learners, who are not English first language speakers. Your input can be very essential to developing a clearer understanding, exploring practical measures and strategies of improving the quality of education in all schools.

WHAT IS THE NATURE OF MY PARTICIPATION IN THIS STUDY?

You are going to engage in face-to-face interviews that may be captured on the audio recorder depending on your permission to do so. In the interview you are required to respond to questions where you need to share your knowledge, experiences and perspectives about the experiences you have in teaching grade 6 NS-TECH learners in English language to the learners, who are English second language speakers.

CAN I WITHDRAW FROM THIS STUDY EVEN AFTER HAVING AGREED TO PARTICIPATE?

Participation in this study is voluntary. You have the right to withdraw from the study at any stage if you wish to do so, and no penalty will be given. You are under no obligation to consent to participation.

WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THE STUDY?

By participating in this study, you may benefit from understanding the factors that presents challenges to your teaching effects, and as a result can develop insights into how you can effectively provide instruction as well as establish conducive learning environments for your learners. In addition, your contribution can help inform policies and practices that can enhance quality education for all.

ARE THERE ANY NEGATIVE CONSEQUENCES FOR ME IF I PARTICIPATE IN THE RESEARCH PROJECT?

There are no negative consequences associated with participating in this research. The study falls under category 2 risk, meaning that this study is a low-risk research involving human participants directly in whom the only foreseeable risk is one of inconvenience.

WILL THE INFORMATION THAT I CONVEY TO THE RESEARCHER AND MY IDENTITY BE KEPT CONFIDENTIAL?

You have the right to insist that your name will not be recorded anywhere and that no one, apart from the researcher and identified members of the research team, will know about your involvement in this research. Your answers will be given a code number or

a pseudonym and you will be referred to in this way in the data, any publications or other research reporting methods such as conferences proceedings.

HOW WILL THE RESEARCHER(S) PROTECT THE SECURITY OF DATA?

Hard copies of your answers will be stored by the researcher for a period of five years in a locked cupboard/ filing cabinet in strong room at the University of South Africa for future research or academic purposes; electronic information will be stored on a password- protected computer. Future use of the stored data will be subject to further Research Ethics Review and approval if applicable. Hard copies of the data will be stored and/or electronic copies will be permanently deleted from the hard drive of the computer through the use of a relevant software programme.

WILL I RECEIVE PAYMENT OR ANY INCENTIVES FOR PARTICIPATING IN THIS STUDY?

Please note that there is no monetary value attached to this research. Your participation is completely voluntary. In addition, as a participant, you will incur no financial loss for participation. You may be rewarded with refreshments were necessary.

HAS THE STUDY RECEIVED ETHICS APPROVAL?

This study has applied for ethics approval to the Research Ethics Review Committee of the University of South Africa and awaiting approval. Once available, the approval letter can be obtained from the researcher if you so wish to have one.

HOW WILL I BE INFORMED OF THE FINDINGS /RESULTS OF THE RESEARCH?

Whenever you need to be informed of the final research findings or require any further information you can contact JV Mnisi at 082-560-6069 or email: mavusanamnisi71@gmail.com

Thank you very much for taking time to read this information sheet and for participating in this study.

Thank you

JV Mnisi- Researcher -



ANNEXURE F: PARTICIPANT INFORMATION SHEET

[Assent/Consent]

CONSENT/ASSENT TO PARTICIPATE IN THIS STUDY (Return slip)

I, _____ (participant name): confirm that the person asking my consent to take part in this research has told me about the nature, procedure, potential benefits and anticipated inconvenience of participation.

I have read and understood the study as explained in the information sheet.

I have had sufficient opportunity to ask questions and am prepared to participate in the study.

I understand that my participation is voluntary and that I am free to withdraw at any time without penalty.

I am aware that the findings of this study will be processed into a research report, journal publications and/or conference proceedings, but my participation will be kept confidential unless otherwise specified.

I agree to the recording of the interview.

I have received a signed copy of the informed consent agreement.

Participant Name and Surname (please print) _____

Participant Signature _____ Date _____

Researcher's Name & Surname (please print) : Mnisi JV

Researcher's signature:



ANNEXURE G: CONSENT LETTER FOR PARENTS/GUARDIANS

Parent Consent Letter for Learner's Books and Academic Progress Records

08/10/2025

Dear parent

Firstly, I would like to express my warm greetings. My name is Singo Lebohang and I am conducting research study entitled: Experiences of Grade 6 educators in teaching Natural Science and Technology through English in Rekopantswe circuit. I am kindly requesting for your permission to access your child's school books and academic progress reports for this year 2025.

I am undertaking this study as part of my Master's research at the University of South Africa (UNISA). The purpose of this study is to investigate the challenges experienced by educators in teaching Grade 6 NS-TECH in English. This study's possible benefits are to collect important information that could provide insight into the strategies in teaching NS-TECH through English, knowledge factors that may be affecting the learners' academic performance may be uncovered leading to initiatives to address the challenges in the education of the learners.

If you grant me the permission to access your child's school books and academic progress reports for this year, I will be able to get them from the school. Any information that is obtained in connection with this study will remain confidential and will only be disclosed with your permission. There are no foreseeable risks to your child by accessing his or her books and academic progress reports. However, learners may feel discomfort when sharing poor academic's results. Your child will not receive no direct benefits from providing academic information in the study, however, long-term benefits of academic performance improvement may be yield.

Accessing your child's school books and academic progress reports is voluntary. You and/or your child may decline to provide me with this information without any penalty.

In addition to your permission, you and your child will also be required to sign the assent form which accompanies this letter. The information gathered from the study will be stored securely on a password locked computer or locked cupboard for five

years after the study. Thereafter, the information will be deleted permanently or destroyed. Your consideration is profoundly appreciated. I thank you in advance for allowing me this opportunity.

Name of child _____

_____	_____	_____
Parent/ Guardian's name	Parent/ Guardian's signature	Date

Sincerely

Mnisi JV- Researcher



ANNEXURE H: ASSENT LETTER FOR LEARNERS

EXPERIENCES OF GRADE 6 EDUCATORS IN TEACHING NATURAL SCIENCE AND TECHNOLOGY THROUGH ENGLISH IN REKOPANTSWE CIRCUIT.

Dear Learner

Firstly, I would like to express my warm greetings. I am doing a study on the Experiences of Grade 6 educators in teaching Natural Science and Technology through English in Rekopantswe circuit, at the University of South Africa (UNISA). Your principal has given me permission to conduct this study at your school. I am kindly requesting your permission to access your school books and academic progress records for this year 2025. I am doing this study in order to find out about the factors that affect your academic performance gap when NS-TECH is taught in English, when you are not English first language speakers. This may help to find ways of improving the quality of education in all schools, which will eventually help you and many other learners of your age.

This letter is to explain what I am asking of. There may be some words you might find difficult to understand in this letter. You may ask me or any other adult to explain these words especially your educator or parents. I would like you to make your school books and academic progress reports for this year available. You may give them to your class educator or submit them to the principal's office.

Your name and academic information will never be revealed to anyone; everything will be kept confidential. I will write a report on this study, but I will not use your name in the report or say anything that will let other people know who you are. Providing your academic information is voluntary and you are not forced to give access to your school books and academic progress reports for the purpose of this study. You may withdraw your consent at any time or stage if you wish to do so and no one will punish you. I will not take your school books and academic progress reports with me, but on finishing using them, return them to whomever you would have entrusted them to.

Potential risks are that you may feel uncomfortable sharing your academic results, however I will respect and avoid causing any discomfort. You will not benefit directly from this study, for example there are no rewards or incentives that will be given. If you are granting me the permission I am seeking, you will be asked to sign the form

attached with this letter. If you have any other questions about this study, you can talk to me or you can have your parent or another adult contact me at 082 560 6069.

Do not sign the written assent form if you have any questions. Ask your questions first and ensure that someone answers those question

WRITTEN ASSENT

I have read this letter which asks me to provide my schoolbooks and academic progress reports for this year. I have understood the information about the study and I know what I am being asked to do. I am willing to do so.

Learner's name

Learner's signature

Parent/guardian name

Parent/guardian signature

Sincerely

Mnisi, JV



ANNEXURE I: PARENT/GUARDIAN CONSENT REPLY SLIP

Parent/Guardian Consent Reply Slip

I, _____ (parent name): confirm that the person asking my consent for my child to take part in this research has told me about the nature, procedure, potential benefits and anticipated inconvenience of participation.

I have read (or had explained to me) and understood the study as explained in the information sheet.

I have had sufficient opportunity to ask questions and am prepared to let my child participate in the study.

I understand that my child's participation is voluntary and that they are free to withdraw at any time without penalty (if applicable).

I am aware that the findings of this study will be processed into a research report, journal publications and/or conference proceedings, but that my child's participation will be kept confidential unless otherwise specified.

I agree to the recording of relevant documents and interview/focus group audio recordings and transcriptions.

I have received a signed copy of the informed consent agreement.

Participant Name & Surname (please print): _____

Participant Signature : _____ Date : _____

Researcher's Name & Surname: Mnisi Vusi

Researcher's signature:  Date: 09/10/2025

ANNEXURE J: LEARNER ASSENT REPLY SLIP

Learner Assent Reply Slip

I, _____ (participant name): confirm that the person asking my consent to take part in this research has told me about the nature, procedure, potential benefits and anticipated inconvenience of participation.

I have read (or had explained to me) and understood the study as explained in the information sheet.

I have had sufficient opportunity to ask questions and am prepared to participate in the study.

I understand that my participation is voluntary and that I am free to withdraw at any time without penalty (if applicable).

I am aware that the findings of this study will be processed into a research report, journal publications and/or conference proceedings, but that my participation will be kept confidential unless otherwise specified.

I agree to the recording of relevant documents and interview/focus group audio recordings and transcriptions.

I have received a signed copy of the informed consent agreement.

Participant Name & Surname (please print) _____

Participant Signature

Date

Researcher's Name & Surname (please print): Mnisi JV

Researcher's signature:



Date: 09/10/2015

ANNEXURE K: INTERVIEW SCHEDULE FOR PARTICIPANTS

TOPIC: EXPERIENCES OF GRADE 6 EDUCATORS IN TEACHING NATURAL SCIENCE AND TECHNOLOGY THROUGH ENGLISH IN REKOPANTSWE CIRCUIT

(Med in Education Management)

At

UNIVERSITY OF SOUTH AFRICA

Full names: Mnisi Johannes Vusi

Learner no: 41419642

Postal address: P.O. Box 2865

Hammanskraal

0407

DATA COLLECTION INSTRUMENT

SECTION A

DEMOGRAPHICS

1.1 AGE GROUP OF THE PARTICIPANT

TABLE 1.1 AGE GROUP OF THE PARTICIPANT

AGE GROUP	
25 to 30	
31 to 40	
41 to 50	

1.2 GENDER OF THE PARTICIPANT

TABLE 1.2 GENDER OF THE PARTICIPANT

MALE PARTICIPANT	FEMALE PARTICIPANT

1.3 NUMBER OF YEARS IN THE OFFICIAL POSITION

TABLE 1.3 NUMBER OF YEARS IN THE OFFICIAL POSITION

NUMBER OF YEARS	
5 to 10	
11 to 20	
21 to 30	

1.4 NAME OF SCHOOL AND POSITION

TABLE 1.4 SCHOOL AND POSITION OF THE PARTICIPANTS

SCHOOL	PRINCIPAL	HOD	PL1 EDUCATOR
A			
B			
C			
D			
E			
F			

SECTION B

INTERVIEW QUESTIONS

INTERVIEWER	What challenges do Grade 6 educators face when teaching Natural Sciences and Technology (NS-TECH) through the English medium?
PARTICIPANT	
INTERVIEWER	How does the use of English as the language of teaching and learning impact the teaching strategies employed by Grade 6 educators?
PARTICIPANT	
INTERVIEWER	What are the perceptions of Grade 6 educators regarding learners' understanding and engagement in Natural Sciences and Technology (NS-TECH) taught through English?
PARTICIPANT	
INTERVIEWER	What support do Grade 6 educators receive from school management and district officials to address language-related challenges in teaching Natural Sciences and Technology (NS-TECH)?
PARTICIPANT	
INTERVIEWER	What strategies do Grade 6 educators use to overcome language barriers in teaching Natural Sciences and Technology (NS-TECH)?
PARTICIPANT	
INTERVIEWER	Can you elaborate on the primary obstacles you encounter while teaching NS-TECH in English?
PARTICIPANT	

INTERVIEWER	Did you observe any drop in learner performance, when English is the language of instruction compared to the use of home language?
PARTICIPANT	
INTERVIEWER	What is the effect of code-switching when teaching NS-TECH?
PARTICIPANT	
INTERVIEWER	In what ways does the use of English impact learners' participation during NS-TECH lessons?
PARTICIPANT	
INTERVIEWER	Based on your experience, how effectively do learners' comprehend NS-TECH concepts when taught in English?
PARTICIPANT	
INTERVIEWER	From your point of view, what can be done in order to address the challenges to improving academic achievement of NS-TECH?
PARTICIPANT	

ANNEXURE L: TURNITIN REPORT

Similarity Report	
PAPER NAME	AUTHOR
MNISI JV FINAL MANUSCRIPT 4141964 2.docx	JOHANNES VUSI MNISI
WORD COUNT	CHARACTER COUNT
35555 Words	209278 Characters
PAGE COUNT	FILE SIZE
149 Pages	6.7MB
SUBMISSION DATE	REPORT DATE
Mar 19, 2026 10:52 PM GMT+2	Mar 19, 2026 10:57 PM GMT+2
● 28% Overall Similarity	
The combined total of all matches, including overlapping sources, for each database.	
• 14% Internet database • 22% Publications database • Crossref database • Crossref Posted Content database	

ANNEXURE M: CONFIRMATION OF PROFESSIONAL EDITING



Blue Diamonds Professional Editing
Services (Pty) Ltd.

Email: jacqui@bluediamondsediting.co.za

OR

Email: chris@bluediamondsediting.co.za

WhatsApp: +447895146059nds.co.za

Website: <https://www.bluediamondsediting.co.za/>

Accounts: accounts@bluediamondsediting.co.za

Enhancing YOUR brilliance

4 March 2026

Declaration of editing

EXPERIENCES OF GRADE 6 EDUCATORS IN TEACHING NATURAL SCIENCE AND TECHNOLOGY THROUGH ENGLISH IN REKOPANTSWE CIRCUIT

Johannes Vusi Mnisi

I declare that I have edited and proofread this thesis. The editing was restricted to language usage and spelling, completeness and consistency, technical formatting and formatting the references.

I am qualified to have done such editing, being in possession of a Bachelor's degree with a major in English, having taught English to matriculation, and having a Certificate in Copy Editing from the University of Cape Town. I have edited more than 600 Masters and Doctoral theses, as well as articles, books and reports.

As the copy editor,

- I am not responsible for detecting, or removing, passages in the document that closely resemble other texts and could thus be viewed as plagiarism.
- I am not responsible for editing AI generated text.
- I am not accountable for any changes made to this document by the author or any other party subsequent to the date of this declaration.

Sincerely,

Dr J Baumgardt

UNISA: D. Ed. Education Management

University of Cape Town: Certificate in Copy Editing

University of Cape Town: Certificate in Corporate Coaching



Jacqui Baumgardt
Full Member

Membership number: BAU001
Membership year: March 2025 to February 2026

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