

**Mediating Learning of Nutrition Through Using Traditional Food
Processing and Preservation to Grade 6 Rural School Learners**

A thesis submitted in fulfilment of the requirements for the degree

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By

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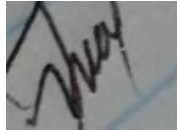
Co-supervisor: Dr Chrispen Mutanho

February 2024

Declaration of Originality

I Nomvume Tyeda (17T2522) declare that this thesis has not been submitted for a degree in any other university apart from Rhodes University and I declare that it is my work, written in my own original words. It has only been submitted for the Degree of Master's at Rhodes University. Where I have cited the words or ideas of other researchers, these have been acknowledged using complete references according to the departmental guidelines.

Signature:

A small, square image showing a handwritten signature in black ink on a light-colored background. The signature is stylized and appears to be 'Nomvume Tyeda'.

Date: February 2024

Dedication

I dedicate this thesis to my mother who passed away while I was still on this journey, Tyeda Nothemobile Mazibula who nurtured me through hardships and taught me to be a self-reliant person. I also dedicate this to my daughter, Thando who encouraged me to believe in myself.

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A heartfelt thanks to all study participants, including Indigenous Knowledge Custodians, Mathawuzela and Mbotho (their clan names), *enkosi zinkode ulwazi eninalo lutyebile luyafundisa, nizizisele zenyathi. Nenjenjalo nakwabanye nibonise Ubuntu enindinike bona* “thank you, for the valuable knowledge you possess which enriches our learning. Thank you for demonstrating Ubuntu throughout”. Your valuable *contributions* have greatly enriched the project.

To my Grade 6 learners in Natural Sciences and Technology at Buzongoma J.S.S. (pseudonym), I extend my deepest thanks for your dedication and commitment throughout the project. I appreciate your willingness to sacrifice your break time and engage in research within the community. Your enthusiasm for learning is evident, I commend you for being active young researchers. May God continue to bless every one of you.

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Abstract

Rural learners, especially those in the school where I teach, seem to grasp science in a disconnected manner, and hence struggle to understand it. This concern aligns with the findings of the Trends of International Mathematics and Science Studies, which notes poor performance in science among learners in South Africa. When examining these challenges, learners appear to inhabit a realm divided by a river, struggling to bridge the gap between what they learn at home and what is taught at school. Against this context, this research aimed to mediate the learning of nutrition for Grade 6 rural school learners by integrating traditional ways of food processing and preservation.

The interpretivist and Indigenous research paradigms underpin the research. I used the Ubuntu perspective within the Indigenous research paradigm, which emphasises respect and humble togetherness. This qualitative case study took place at a rural school in the OR Tambo Coastal district in the Eastern Cape. It involved 14 Grade 6 Natural Sciences and Technology learners, a critical friend, and two Indigenous Knowledge Custodians. Various methods were used to collect data, including group activities by learners, participatory and lesson observation, focus group interviews (sharing circles), and learners' journal reflections.

The findings of the study revealed the significance of integrating Indigenous Knowledge with modern scientific principles, engaging in experiential and hands-on learning activities, involving Indigenous Knowledge Custodians, and using visual learning aids to enhance learners' engagement and sense-making of nutrition. The study recommends that Indigenous Knowledge should be integrated with modern science to provide a comprehensive understanding of the topic of nutrition.

Keywords: Natural Sciences and Technology; nutrition; food preservation and processing; Indigenous Knowledge; sense-making; sociocultural theory; contiguity argumentative theory

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Abbreviations and/or Acronyms

CAT	Contiguity Argumentation Theory
CAPS	Curriculum Assessment Policy Statement
DoE	Department of Education
IKCs	Indigenous Knowledge Custodians
IK	Indigenous Knowledge
NCS	National Assessment Statement
NST	Natural Sciences and Technology
SCT	Sociocultural Theory
TIMSS	Trend of International Mathematics Science Studies
WS	Western Science
ZPD	Zone of Proximal Development

CHAPTER ONE: SITUATING THE STUDY

1.1 Introduction

The primary goal of this interventionist study was to investigate the influence of traditional methods of food processing and preservation on the capability of Grade 6 rural school learners to understand and participate in the topic of nutrition. This chapter introduces the study, outlining its background and detailing what spurred me on as a science teacher to undertake this interventionist study. It also includes my account, problem statement, justification for conducting the research, and its importance. The objectives and questions of the research are also outlined in this chapter. In addition, I provide a condensed overview of theoretical and analytical frameworks as well as the methods employed for data collection. Finally, I outline the key concepts and the thesis structure. The chapter concludes with a chapter summary.

1.2 Background of the Study

Rural learners, particularly those in the rural schools where I teach, appear to absorb science in a vacuum that has no relevance to their day-to-day lives, and, hence, they find it challenging to comprehend (Gwekwerere, 2016). The same issue has been raised in the Trends in International Mathematics and Science Study (TIMSS) (2019), which states that South African learners are performing poorly in science. For instance, the 2019 TIMSS national assessment demonstrated that learners' attainment was low due to their perception of the significance of mathematics and science.

The report also pointed out that learners do not have a sufficient understanding of science, leading to a lack of appreciation for scientific concepts that do not align with their sociocultural background (Mavuru & Ramnarain, 2020). When we look at these issues, learners seem to be living in a world divided by a mountain, unable to connect what they are learning at home to what they are learning at school (Tyeda, 2024). Aikenhead and Jegede (1999) refer to this phenomenon as border crossing. As a result, some researchers have proposed a revision of the science curriculum to reflect African knowledge and identity (Aikenhead & Jegede, 1999; Kakambi, 2020; Mukwambo et al., 2014). This is intended to provide learners with a better

understanding of the science they are studying, and these researchers have thus proposed that Indigenous Knowledge (IK) should be integrated during science teaching and learning.

My teaching experience over the past 15 years as a Natural Sciences and Technology (NST) teacher has made me realise that most of my learners do not perform well in science, especially when it comes to questions that require them to apply scientific knowledge in science. They seem bored during my lessons, too, explaining that concepts underlying science are so difficult to grasp. My assumption has been that I might not be teaching them in a way that captured their interest. However, when I analysed the National Curriculum and Assessment Policy Statement (CAPS) document and textbooks, I realised that they contain little that relates to the everyday experiences of learners (Gwekwerere, 2016).

Although the topic of nutrition is relevant to learners' everyday lives (Kuhlane, 2011), as alluded to earlier, there seems to be a lack of relevant examples in textbooks and learning materials that are linked to learners' everyday life experiences (Gwekwerere, 2016). Instead, the examples that are used are more westernised and do not consider learners who come from deep rural areas. For example, the preservation and processing of food focuses more on Western methods. Yet, the textbook could give the example of a calabash that stores milk that turns into sour milk (*amasi*) (Nuntsu, 2020), as this would be familiar to those who come from rural areas, instead of the example of using a refrigerator to keep food cold.

It is noteworthy that the CAPS document for grades R–12 (DBE, 2011) tries to address this by focusing on the role of knowledge, skills and values in education. Gwekwerere (2016), noted that all learners should acquire and apply knowledge and skills in ways that are relevant to their live. My interest in this particular research was furthered when I participated in a 12-week research project conducted at Rhodes University by Mutanho (2021), where he invited an Indigenous Knowledge Custodian (IKC) to demonstrate the making of *umqombothi*, a traditional alcoholic beverage, in which we found that science concepts were embedded in the indigenous practice. That inspired me to undertake a study on the use of traditional food processing and preservation to mediate the learning of nutrition for my Grade 6 rural school learners. In this context, learning about scientific concepts in nutrition was mediated using food processing and preservation resources that are local to the selected community where the study was conducted.

1.3 My Personal Experience – Situating Myself in the Study

I spent my childhood in a rural area of the Eastern Cape and received my primary education there as well. Growing up, I was immersed in the local indigenous cultural practices through our traditional way of life. This included participating in activities such as consuming *amarhewu* (a traditional drink made from maize meal), grinding maize to make porridge and enjoying *imifino* and stamped mealies as our main food. I had the support and presence of both my parents and siblings, although due to my father's work commitments, I spent most of my time with my unemployed mother.

I gained valuable knowledge from my mother, who taught me various Indigenous practices, including gathering firewood, grinding maize, cultivating and preserving pumpkin and making *amarhewu*. Additionally, I was responsible for looking after sheep and goats as well as milking the cows. I also participated in ploughing the fields as part of my daily chores. While performing these tasks, I would engage in singing traditional songs. The act of singing instilled in us the belief that our work would be completed swiftly, as if we were hurrying to indulge in our customary games, like *upuca*, three tins, *uqaphu* and see-saw, which were associated with a specific season. Television was absent from my household, and it was not something I ever contemplated, as my understanding of television was non-existent in my youth.

Throughout my academic years, I had to walk approximately five kilometres between my home and school. The school was positioned on the opposite side of a mountain, and regardless of the prevailing weather conditions, be it sunny or rainy, I needed to ascend the hill on my way to school. I used to take cornbread or bread made with maize meal known as *udodorhoyi* or *isigezenga* with me to school. *Udodorhoyi* got its name because we used *umqobothi* as a catalyst, as yeast was something unfamiliar to us.

At school, we often engaged in memorisation rather than grasping concepts through understanding. I attended school during a time when slates were used instead of exercise books. We cleaned the slates between subjects, often using our saliva. The reporting process involved being called to the assembly, where the principal would announce those who passed. If you were not called, you had to repeat the class. Looking back, I find it unfair, as it led to public recognition of success or failure.

As I advanced to higher standards (grades), I observed that the informal education I received at home was left behind as I climbed the academic mountain, gaining new knowledge from school. Upon leaving school, I found that what I learned at school had no connection to the knowledge I acquired at home. School and my home seemed isolated, divided by a metaphorical mountain (Tyeda, 2024), with no link between the two realms of learning (Aikenhead & Jegede, 1999; Le Grange, 2007).

Consequently, I employed the metaphor of climbing the mountain to convey the idea that the knowledge I acquired at home stayed behind, and upon reaching school, I would acquire new information without necessarily applying it to the new context. This climbing of the mountain forced me to live in two different worlds because the knowledge I learned in school was different from my sociocultural background (Mavuru & Ramnarain, 2020). Unfortunately, our teachers did not acknowledge our prior everyday knowledge, as proposed by Kuhlman (2011).



Figure 1.1: Climbing the mountain (Wikimedia.org/Wikipedia)

1.4 My Positionality and Reflexivity

As a researcher, Holmes (2020) stated that one cannot detach oneself from the social world in which one lives (see Section 1.3) and objectively conduct research. Bertram and Demps (2018) further asserted that all researchers have preconceived notions and biases and that these biases can affect the interpretation and presentation of the participants' voices (Thomas, 2013). In this context, I have provided an open and candid disclosure and explained where and how I believed my opinions may have had an impact on the conduct and output of the study. Throughout the research process, I adopted a reflective approach to gain insight into the impact of my

positionality. It is important to note that learners may view me as a more knowledgeable teacher as they are already familiar with me. To alleviate this dilemma, I introduced myself as their co-learner and explained that the purpose of my intervention was to generate something new and to learn something that was not yet available (Sannino et al., 2016).

Secondly, when I was doing this study, I was the departmental head for the whole school, and I was also a master's student at Rhodes University. I think this could have had an impact on the study from a positionality point of view. To address this issue, I ensured that all participants in this study were aware and understood that their participation in the study was entirely voluntary. Moreover, that they had the option to withdraw from the study any time they chose without any prejudice. I know it is a sign of rudeness in my culture to say, with or without you I can do this (*ukhona ungekho yonke le nkqubo izo qhuba*), as it shows that you do not care (*awumcenganga*) (Mutanho, 2021). I would tell them that I am a learner like them, and they must not see me as a teacher.

The culture of participants was shaped by the ethos of Ubuntu – everyone was looking forward to having a conversation where everyone's point of view would be taken seriously with no room for anyone to take the high ground (Seehawer, 2018). As alluded earlier, I also informed the learners that I would be a co-learner during the presentations of the IKCs, who are well-versed in the traditional methods of food processing and preservation. This implies that I conducted this study with my learners rather than on them as they were actively contributing to the co-creation of knowledge (Ngcoza & Southwood, 2015).

I also recognise that the Indigenous Knowledge Custodians (IKCs) were responsible for preserving the cultural heritage of the traditional methods of food processing and preservation, and therefore were more knowledgeable than others as suggested by Vygotsky (1978). In other words, the IKCs' contributions would expand my knowledge of Indigenous practices concerning nutrition embedded in cultural practices.

1.5 Statement of the Problem

The National Curriculum Statements (NCS) for grades R–12 were introduced by the Department of Education (DoE) in 2002 to enable learners to acquire and apply knowledge and skills that are relevant to their own lives (Gwekwerere, 2016), with a particular emphasis on

integrating IK into science teaching. Despite this directive from the DoE, there remains ambiguity around how exactly IK should be integrated into these lessons.

According to Aikenhead and Jegede (1999), Kuhlane (2011) and Le Grange (2007), learners struggle to link the knowledge gained in school with their existing everyday knowledge, which Le Grange (2007) pointed out as a cognitive dissonance or cognitive conflict. These scholars argue that the successful and effective integration of IK into science can be achieved only if the learners' prior everyday knowledge can be accommodated and that textbooks should provide examples that relate closely to what learners already know from their lived experience rather than focusing solely on the Western culture. Supporting this perspective, Liveve (2017) emphasised that prior knowledge in the teaching of science concepts becomes relevant only when science is connected to what learners already know.

For example, in the topic under my study, a learner could be asked general knowledge questions about making *isigezenga*, bread that is made from fresh corn, which is their known knowledge (Mayana, 2020; Nandjedi, 2022). I believe that such a question could motivate learners to learn the science concepts of food processing and preservation as they can relate to them, and this would, in turn close the gap between school knowledge and knowledge from the learners' homes or community, which Aikenhead and Jegede (1999) refer to as 'border crossing'.

At a personal level, the study might encourage me as a science teacher to value the learners' contributions to the traditional ways of food preservation and processing, especially the knowledge they have from their homes and communities. Also, it could improve my teaching techniques, allow the learners to feel comfortable enough to contribute during science lessons and provide different strategies to make science enjoyable and accessible. Against this background, I contend that this study could contribute to the learning of nutrition for rural school Grade 6 learners by leveraging food processing and preservation methods.

1.6 Rationale and Significance of My Study

The main purpose of this interventionist study was to mediate the learning of nutrition through traditional food preservation and processing for Grade 6 rural school learners to make science accessible and relevant to them. The presentations were done by two IKCs to arouse learners' interest in learning traditional ways of processing and preserving. Similarly to Nyamakuti's

(2020) study conducted in Namibia, this study allowed my learners to express their views and in the process value other cultural ways of preserving and processing food, as the study participants were from different cultures. The study might also help the learners link what they learn from their homes and community with the science concepts they learn at school. For example, at home, they know that mealies can be preserved for a long time by making ¹*isiswenye*. In contrast, at school, they learn that for mealies to stay fresh longer, some preservatives are added to improve their nutritional value.

The study might thus assist in contextualising science in rural schools by integrating learners' IK in science lessons to promote meaningful, authentic, and enjoyable learning environments. The integration of IK into science lessons could assist the learners in understanding new concepts, such as traditional ways of food processing and preservation, to mediate the learning of nutrition. They might also gain insight into the nutritional content of food that has been processed and preserved using conventional methods, as these processes do not involve the addition of any additives. To integrate traditional processing and preservation methods, such as salting and drying, various techniques might be employed to preserve the nutritional value of the food.

This study might also assist fellow teachers in realising opportunities that might help learners, especially those who come from under-resourced schools. Furthermore, at a personal level, it might help me to improve my teaching practice and ultimately improve my learners' performance in science.

1.7 Research Goal and Research Questions

The main goal of this interventionist study was to mediate the learning of nutrition through traditional food processing and preservation for Grade 6 rural school learners. To achieve this goal, the following research questions were addressed:

1. What knowledge of traditional food processing and preservation do Grade 6 rural school learners know from their homes and community?

¹ *Isiswenye* is made by hanging corn over an indoor fire, which results in the corn kernels acquiring a blackened hue due to exposure to smoke.

2. How do the presentations by the IKCs on traditional food processing and preservation and the consolidation thereof enable and/or constrain Grade 6 rural school learners to talk about and make sense of the topic of nutrition?
3. How does an exemplar lesson that integrates traditional ways of processing and preserving food enable and/or constrain Grade 6 rural school learners to talk about and make sense of the topic of nutrition?

1.8 Theoretical and Analytical Frameworks

The theory underpinning this study is sociocultural theory (SCT). Developed by Vygotsky (1978), the SCT asserts that learning takes place within a cultural framework where social interactions play a crucial role and in which language serves as an integral tool for communication. These interactions may take place between learners and their teachers, as well as between learners and their peers, where other learners with more advanced knowledge can assist those who are having difficulties. According to Vygotsky's SCT, learners experience enhanced learning when they engage with materials from their own culture through interactive sessions. However, the process of learning is intricate and may involve tensions or differences between IK and school-taught knowledge. For this study, I discussed the following key components of Vygotsky's SCT: *mediation of learning, culture and language, social interaction*, and the *Zone of Proximal Development (ZPD)*. Moreover, I complimented SCT with Ogunniyi's (2007a) Contiguity Argumentative Theory (CAT).

1.9 Data-Gathering Methods

To gather data for this study, four techniques were used. These included:

- A group activity;
- Participatory and lesson observations;
- Focus group interviews (sharing circles); and
- Journal reflections.

1.10 Definition of Key Concepts Used in the Thesis

- **Culture:** the shared beliefs, customs, traditions, behaviours and values that characterise a group or society (Kibirige & van Rooyen, 2016).

- **Conceptions:** the broad concepts and perceptions held by learners concerning science and the incorporation of local or IK (Atallah et al., 2010).
- **Dispositions:** an individual's habit of behaving in a certain manner when presented with an opportunity (Graven, 2012).
- **Nutrition:** getting the food and nourishment that you need for health and growth.
- **Sense-making:** transforming a situation into a reality that is explicitly understood and that acts as a stepping stone to action (Nikodemus, 2007).
- **Social interaction:** the act of engaging and communicating with others (Vygotsky, 1978).
- **Visualisation:** the act of forming visual images in the mind (Vermirousky, 2013).

1.11 Thesis Outline

The research was carried out at Buzongoma J.S.S. (pseudonym), an educational institution situated in the rural areas of the OR Tambo Coastal district in the Eastern Cape. The thesis is comprised of six chapters, as follows:

Chapter One: This chapter presents an overview of the study's background and emphasises the purpose of conducting this interventionist research. It explains the problem statement, including the uncertainties and gaps in the curriculum implementation process. Furthermore, it details the rationale and significance of the study in relation to the use of traditional ways of processing and preserving food to mediate learners' learning about nutrition. A brief discussion of the theoretical and analytical frameworks that informed the study is also provided. Finally, the research goal and research questions that guided the study are also stated.

Chapter Two: This chapter represents a literature review focusing on the integration of IK into science education. The literature explores topics such as nutrition, food processing and preservation concepts and methods, and learners' prior knowledge. Additionally, the chapter explores literature concerning the conceptual, theoretical and analytical frameworks that form the basis of this study.

Chapter Three: This chapter presents an overview of the research methodology used in the study. The first section describes the research paradigms and design, which includes a case study, as well as the research objectives and questions. Thereafter, the chapter elaborates on the research site, data, and collection methods, as well as their applications. Finally, it covers data analysis, ethical considerations, trustworthiness and positionality.

Chapter Four: In this chapter, I share the information, analysis and discussions derived from group activities and the presentations by the IKCs.

Chapter Five: This chapter presents the data analysis and discussions derived from observations (participatory and lesson observations), focus group interviews (sharing circles) and learners' reflective journals.

Chapter Six: This chapter provides a summary of the study's findings in relation to the research questions. It includes recommendations and limitations, discusses potential areas for future research, offers a summary of reflections, and concludes with key findings.

1.12 Chapter Summary

In this chapter, I explored the literature shaping this study, the discussion commences with an investigation of nutrition and the crucial role of food processing and preservation. I provided definitions for IK and highlighted their relevance to the study. The conceptual framework, focusing on learners' conceptions, dispositions and sense making regarding the integration of IK in science teaching was then presented. Thereafter, I delved into the theoretical and analytical frameworks used in the study. The next chapter will address the research methodology employed.

CHAPTER TWO: LITERATURE REVIEW AND THEORETICAL FRAMEWORKS

2.1 Introduction

This study aimed to enrich the educational experience of rural Grade 6 learners by imparting knowledge of nutrition through the lens of traditional food processing and preservation methods. In this chapter, an exploration of relevant literature sheds light on these traditional practices and also underscores the importance of literature in research. Engaging with existing literature serves as a foundation for this study, providing context, theoretical underpinnings and a critical perspective on past and current methodologies in nutrition education. This chapter investigates various dimensions of nutrition, elucidates traditional methods of food processing and preservation, and examines how these practices intersect with and enhance contemporary educational approaches. By doing so, the chapter sets the stage for a comprehensive understanding of the subject matter, highlighting its relevance and application in the broader context of rural education and Indigenous Knowledge Systems (IKS).

2.2 Nutrition

The topic of nutrition, embodying the principles of a balanced diet and its health implications, is a pivotal element of the Grade 6 curriculum for NST, as specified in the CAPS. This educational framework, according to Agunbiade et al. (2017), is designed to enlighten learners about the multifaceted aspects of nutrition, emphasising the role of dietary choices in sustaining health and well-being. Cook (2005) supports this by highlighting the significance of integrating visual representations in science education to deepen learners' understanding of how various foods and their processing methods contribute to a balanced diet, a key factor in the growth and development of young learners.

While the CAPS document primarily focuses on food processing and preservation from a Western standpoint, it concurrently paves the way for exploring indigenous methods, especially those practiced in the communities where the learners reside. This facet of the curriculum, as discussed by Baquete et al. (2016), provides an invaluable opportunity to delve

into how food is prepared and preserved using traditional techniques, which typically avoid the use of artificial additives and colourants. DuToit (2005) elaborates on the environmental integrity of African IKS, underscoring the importance of such traditional practices in preserving both cultural heritage and nutritional value. Furthermore, Aste (2017) examines the role of active refrigeration technologies in food preservation, emphasising the need to consider local and traditional preservation methods in various contexts. These perspectives collectively enrich the understanding of nutrition education, blending modern scientific approaches with traditional knowledge and practices, as asserted by Cobern and Loving (2001), who stress the need to define ‘science’ in a multicultural world to make science education more inclusive and effective.

A prime example of traditional food practices can be seen in the use of traditional leafy vegetables, often referred to as ‘African vegetables’. These vegetables, which include a variety of plants whose leaves, pods, stems, roots, flowers, fruits or bark are consumed, play a pivotal role in the diets of many rural communities and are increasingly gaining popularity in urban areas (Cimi et al., 2020; Kimiywe et al., 2007). These vegetables are not only consumed fresh or cooked but are also processed through drying and grinding to create new products like soup additives. Traditional leafy vegetables are recognised for their rich content of essential nutrients and have been noted for their immunosuppressive properties (Cimi, 2019). They are a vital source of dietary fibre, vitamins B and C, proteins, and minerals such as calcium and iron, and contribute significantly to a balanced diet and disease prevention (Heber, 2004; Shanker, 2001). The nutritional value of these indigenous vegetables is closely linked to the reduced risk of various health conditions, including cancer, heart disease and chronic ageing diseases. The recognition of their health benefits has led to innovative market trends, with entrepreneurs packaging these vegetables in various forms, including powders, and promoting them as immune boosters. This trend underscores the growing appreciation and demand for traditional, nutrient-rich foods in both local and broader markets.

2.3 Food Processing and Preservation

Food processing and preservation can be defined as all activities and procedures necessary to transform raw agricultural products into safe and nutritious products. Tumancy (2020) defines food processing as the exchange of agricultural products for different value-added foods. Food

processing is any method employed to reduce the number of unwanted microorganisms in food and to enhance the stability and safety margins of foodstuffs for human consumption. This can be accomplished through physical and chemical processes or a combination of the two that alters the physical characteristics of foodstuffs to make them safer or more suitable for consumption.

Food preservation, on the other hand, is a crucial practice aimed at preventing or delaying the deterioration of food quality and the loss of its nutritional value over time. This can be achieved through various methods, including canning, refrigeration, and dehydration, as well as traditional techniques like harvesting and drying. Hashondili (2020) adds depth to this understanding by highlighting recent advancements and emerging trends in food preservation methods. Her research emphasised the importance of integrating both traditional and modern preservation techniques to enhance the shelf life of food while maintaining its nutritional value. This comprehensive approach to food preservation not only ensures food safety but also plays a vital role in sustaining food security, particularly in areas with limited access to advanced preservation technology.

2.4 Methods of Processing and Preserving Food

There are various methods by which food is processed and preserved in traditional and Western ways. Traditional methods of preserving food, such as salting, cooking, drying and smoking, have been used for centuries to meet the cultural needs of people. However, due to the high demand for food, these traditional methods of processing and preservation were unable to satisfy the needs of people in society, leading to the development of modern ways of processing and preservation. Notwithstanding their efficacy, these new methods have a detrimental effect on the younger generation and the environment. Young people may not be familiar with traditional ways of preserving their food during a crisis due to the new electronic methods that have blurred traditional methods.

As the population continues to grow and the demand for food continues to rise, scientists have developed innovative methods of processing and preserving food to address the lack of planning in agriculture and to produce value-added products (Rahman, 2007). Da Silva (2019) challenged traditional methods of preserving food, claiming that salting and heating lead to the loss of key nutrients, particularly vitamins, in fruits and vegetables. He suggests that the use of

enzymes is the most effective approach to the processing and preservation of food, particularly fruits and vegetables. He emphasises that enzymes are employed as biological agents that combat fungal infections in fruits and vegetables that have been harvested. The enzymes do not alter the taste of the food but rather act on the components that tend to attract the fungal cells that cause any harm to the food. Furthermore, he argues that the application of enzymes increases the expiration date and provides a promising solution to enhance the shelf life of food. (Da Silva, 2019)

However, other scholars consider the use of enzymes an expensive method of processing and preservation that may not be accessible to all people. In addition, it may also have a detrimental effect on human health. As a result, health programmes are promoting the consumption and love of traditional foods. In addition, African people are being encouraged to stay true to their African heritage by appreciating their culture (Aluga & Kambwe, 2016). Finally, traditional preservation methods are important food strategies, but knowledge and skills to prevent their loss have not been documented.

2.5 Learners' Prior Knowledge

The concept of 'prior knowledge' refers to the pre-existing understanding and experiences that learners bring to the educational setting. Roschelle (1996) posits that learning is heavily reliant on this existing knowledge base. Supporting this, Cook (2005) defines prior knowledge as the acquisition of conceptual understanding that shapes perception and attention. The effect of prior knowledge on learning processes is further underscored by Mavuru and Ramnarain (2020), who advocate its recognition in effective teaching strategies.

However, the use of prior knowledge in educational contexts is not without critique. Taylor (1999), for instance, warns that not all forms of everyday knowledge are relevant for classroom learning. He cautions that if prior knowledge is not accurately interpreted or communicated, it may lead to misunderstandings rather than enlightenment among learners. It is for this reason that Kuhlana (2011) expands the concept to 'prior everyday knowledge', encompassing the learning acquired from daily life and cultural practices. This form of knowledge, often deeply rooted in IK, reflects the cultural and community experiences that learners bring into the classroom. This intersection of everyday experiences with formal education is highlighted by

Dimos and Tsapralis (2006), who note that such knowledge can provide a foundational base for structuring learning.

Delving deeper into IK, this study acknowledges the rich traditional knowledge that learners bring from their rural homes and communities. Such knowledge is not just a mere addition to the curriculum but is integral to understanding the learners' worldviews and enhancing their educational experience. However, as Taylor (1999) suggests, science should be cautious to ensure that this knowledge is effectively integrated to avoid misconceptions. This sentiment is reiterated by Mavhunga and Rollnick (2013).

The integration of learners' prior knowledge, especially IK, into the curriculum, is not just about acknowledging their sociocultural backgrounds; instead, it is about actively using this knowledge to make learning more relevant and engaging. Agunbiade et al. (2017) emphasise the relationship between learners' attitudes towards science and the characteristics of the learning environment, suggesting that when learners see their own experiences and knowledge reflected in the curriculum, their engagement and interest in the subject matter can increase significantly.

Understanding the pre-existing knowledge that learners bring into the classroom allows teachers to create a bridge to new learning experiences. This approach aligns with Vygotsky's theory of the ZPD, which suggests that learning occurs most effectively when it builds upon what the learner already knows. In this regard, Baquete et al. (2016) discussed how IK related to physics concepts, when acknowledged and integrated into teaching, can make abstract scientific ideas more tangible and comprehensible to learners.

While the benefits of integrating prior knowledge into education are clear, there are nonetheless challenges that need to be addressed. According to Cobern and Loving (2001), one significant challenge is ensuring that IK is integrated in a way that respects its origins and maintains its authenticity. This requires teachers to be not only knowledgeable about IK but also sensitive to its cultural significance. DuToit (2005) emphasises the importance of probing the roots of African nationality to understand the environmental integrity of African IKS, suggesting a need for deeper cultural understanding among teachers.

Looking forward, the integration of prior knowledge, particularly IK, into education requires a continuous effort to ensure that it is done respectfully and effectively. This entails ongoing research, teacher training and curriculum development to ensure that the rich cultural heritage of learners is not just recognised but also celebrated and utilised as a valuable educational resource. Building on these insights, the next section will focus on IK. It will explore how this specific form of prior knowledge, deeply ingrained in the learners' cultural heritage, can be leveraged to enrich the educational process and foster a more inclusive and holistic learning environment.

2.6 What is Indigenous Knowledge?

There is no universally accepted definition of IK; different authors offer varying definitions. For instance, Senanaye (2015) refers to IK as unique knowledge confined to a particular culture or society. This knowledge is transferred from one generation to another in the form of traditional knowledge and folklore, verbally through word-of-mouth, and culturally through rituals, dances, songs and stories (Liveve, 2022; Nuntsu, 2020). Nyika (2017) sees IK as the knowledge people pick up while living and working in their community. This knowledge is gained from birth and lays the foundation for all knowledge a person is going to acquire throughout his or her entire life (Nyika, 2017). Similarly, Kibirige and van Rooyen (2006) describe IK as an inheritance of skills and knowledge specific to a culture, which comprises accumulated wisdom that has been cultivated and transmitted across generations.

Aikenhead and Jegede (1999) and Ogunniyi and Ogawa (2008) advocate for the integration of IK into the school curriculum, particularly within science classrooms. They believe integrating IK into education science yields numerous benefits, including the ability of IK to facilitate the exchange of knowledge between the home and school environments (Aikenhead & Jegede, 1999). Similarly, Govender (2014) suggests that the integration of IK into science classrooms can inspire learners to engage with science and increase their participation in the subject (Sedlacek & Sedova, 2017). Likewise, Kibirige and van Rooyen (2006) assert that the use of IK as indigenous prior knowledge in the classroom can enhance science teaching and serve as a foundation for exploring concepts related to western science (WS). On the other hand, Cobern and Loving (2001) argue that the integration of IK into science education should address potential challenges and the necessity of justifying the teaching of science. Furthermore, Le

Grange (2017) explains that learning science using IK may lead to cognitive conflicts between scientific language and everyday language.

Furthermore, integrating IK into science classrooms contributes to the decolonisation and Africanisation of science education (Mukwambo et al., 2014; Mutanho, 2021; Seehawer, 2018a). As such, this study aimed to integrate traditional food processing and preservation methods through presentations by IKCs. Within this framework, learners can receive assistance in addressing inquiries related to nutrition and concepts such as food processing and preservation.

However, it is important to recognise that IK should not be the only method used for teaching of science; rather, science teachers should acknowledge the potential challenges that may arise when integrating it into teaching, as emphasised by Cobern and Loving (2001). Furthermore, Le Grange (2007) contends that learning using IK may lead to cognitive conflicts between scientific language and everyday language. This struggle may stem from the need to enrich learners' existing knowledge from their respective backgrounds with the new concepts and knowledge they acquire in the school environment. This notion is supported by Kibirige and van Rooyen (2006), who suggest that learners may find enjoyment in connecting their old and new knowledge. For instance, learners may have traditional knowledge from their homes and communities, such as preserving mealies using smoke after harvesting (Mukwambo et al., 2014), and, in contrast, the new knowledge they acquire at school may involve modern food processing and preservation techniques. This underscores the importance of science education at school accommodating learners' existing everyday knowledge while considering what learners already know from their backgrounds (Kuhlane, 2011).

While there are compelling arguments in favour of integrating IK into science education, there are also noteworthy limitations to consider. Cobern and Loving (2001) caution against viewing IK as the sole solution to science education, highlighting potential challenges when integrating it into science classrooms. In contrast, Snively and Corsiglia (2001) disagree with this perspective, asserting that indigenous science encompasses valuable scientific knowledge. Le

Grange (2007) suggests that learning using IK may lead to conflicts between scientific language and everyday language, while on the other hand, Ogunniyi (2007a) advocates for the integration of the two knowledge systems. In addition, Mukwambo et al. (2014) point out that

many science concepts are not clearly articulated in indigenous languages and practices, emphasising the need for scientific clarification to be linked to IK in the Africanisation of the school science curriculum. These varying viewpoints underscore the complexity and importance of carefully considering the integration of IK into science education.

Scholars such as Ogunniyi (2007a), Keane et al. (2016), Afonso-Nhalevilo (2013), Mukwambo et al. (2014), and Mhakure and Otuluja (2017) caution against idealising IK as the sole solution to teaching science. They advise that any misconceptions about IK should be addressed before integrating new knowledge. Kibirige and van Rooyen (2006) stress the importance of integrating IK in classrooms to enhance science education, emphasising the need for a harmonious integration of Western and traditional knowledge systems. Shizha (2007) notes that integrating IK in science lessons can boost learners' confidence and self-esteem. Concurring, Baquete et al. (2016) suggest that integrating science with IK can enhance learners' enthusiasm for science and foster an appreciation for and preservation of knowledge from their heritage.

2.7 Indigenous Knowledge in South African Science Education

Post-apartheid South Africa has witnessed significant transformations in its educational system, aimed at addressing the diverse needs of its democratic citizenry. Central to this transformation, as stated by the DoE (2003), is the integration of IK into the science curriculum. This change acknowledges the country's rich diversity and the diverse sociocultural backgrounds of learners (Mavuru & Ramnarain, 2020). However, Nel (2005) points out a historical challenge: the South African educational system has been slow to accept IK, leading to a notable gap in its integration.

O'Donoghue (2004) argues that the integration of IK poses a challenge for African teachers, especially within an education system traditionally grounded in Western scientific ideas. This difficulty is compounded in part by the lack of clear guidelines and support for implementing IK in the curriculum. Le Grange (2007) suggests that successful integration requires teachers to not only recognise the importance of IK but also to possess the skills to effectively integrate it into their teaching methods.

Recent efforts in South African education have been aimed at bridging this gap. For instance, De Beer and Whitlock (2009) highlight initiatives to introduce IK in life sciences classrooms, demonstrating the potential for enriching science education with culturally relevant content. Additionally, and as alluded to earlier, Baquete et al. (2016) provide examples of how IK, particularly in the field of physics, can offer valuable insights and alternative perspectives that enhance scientific understanding.

In the context of these developments, this study aimed to provide rural Grade 6 learners with the opportunity to learn about nutrition through traditional methods of food processing and preservation. By doing so, the study aligns with current educational policies and responds to the call for a more inclusive and culturally relevant science curriculum that can increase learners' understanding of nutrition but also foster a deeper appreciation of their cultural heritage within the context of scientific education.

2.8 The Need for the Integration of IK in Science Lessons

Some researchers, including Battiste (2005) and Mushayikwa and Ogunniyi (2011), believe that integrating traditional knowledge into science education is a beneficial development that can stimulate discussions between Western and traditional modes of thinking. Aikenhead and Jegede (1999) suggest that IK can serve as a link between learners' home and school science experiences. Kibirige and van Rooyen (2006) contend that teaching science is more effective when using learners' cultural knowledge in the classroom. Their IK aids in comprehending Western scientific concepts, fostering better communication among individuals. Nikodemus (2017) also posits that IK plays a crucial role in bridging the gap between familiar learner experiences and successful teaching outcomes.

Scholars such as De Beers and Whitlock (2009) argue that the integration of IK into science education recognises the learner's social identity and can transform learning into a beneficial experience and alter the learner's approach to science. Furthermore, IK can stimulate creative thinking in both teachers and learners. It can also provide learners with an opportunity to gain understanding from their own experience and foster an appreciation of the local content and abstract knowledge that they have acquired from their local communities.

The integration of IK in science lessons provides learners with the opportunity to compare different types of knowledge to their own and the knowledge of their communities, thus fostering critical thinking. IK is a significant component of 'global knowledge'. For instance, several countries have educated their populations on topics related to religious beliefs and practices concerning nutrition, food processing and preservation, medicine, and farming. The integration of IK into science lessons can provide learners with the opportunity to gain a positive perspective on IK, which can lead to increased enjoyment of the educational experience. Additionally, the integration of IK could provide learners with the chance to cultivate a sense of self-awareness and cultural pride.

2.9 Challenges of Integrating IK in Science Lessons

In the analysis of the existing academic discourse, there is a substantial consensus among experts advocating for the integration of IK into the science curriculum. This perspective is strongly supported by the works of scholars like Battiste (2005) and Mushayikwa and Ogunniyi (2011), who emphasise the multifaceted benefits of blending traditional knowledge with formal scientific education. The research underlines how this integration not only enhances the cultural relevance of the curriculum but also enriches the learning experience of students. By drawing on these insights, they align with the view that embracing IK in science education is not just a pedagogical choice but a necessary step towards a more inclusive and holistic educational approach.

However, some scholars, such as Cobern and Loving (2001) and Horsthemke and Schafer (2007), have raised concerns about incorporating IK into science education, suggesting that IK and WS should be considered separate forms of knowledge. For instance, Horsthemke and Schafer (2007) cautioned against labelling indigenous ownership as IK, arguing that this could be misleading and contribute to the marginalisation of other knowledge systems. Additionally, they argue against regarding IK as the sole valid knowledge system (Cobern & Loving, 2001), emphasising that prioritising IK over modern science does not effectively address the core issue of making science accessible to African children. Moreover, they highlight the challenges associated with integrating IK, pointing out the difficulty in identifying the scientific skills embedded in cultural practices, with some of these skills lacking cultural validation. In contrast to the perspectives of Horsthemke and Schafer (2007), Cobern and Loving (2001), Hodson

(2009) advocates for the inclusion of a variety of knowledge systems. They argue that excluding certain types of knowledge from the curriculum would pose obstacles and hinder learners' understanding of science.

In a similar vein, the romanticisation of IK was also warned against by proponents of IK as part of science education, such as Afonso-Nhelevilo (2013), Keane et al. (2016), Mhakure and Otoluwa (2017) and Ogunniyi (2007a). These scholars suggested that any misunderstandings associated with indigenous practices should be corrected.

2.10 Advantages of integrating IK in science classrooms

Several researchers, including Erinoshu (2013), Kibirige and van Rooyen (2006), Le Grange (2007), and Nyika (2017), to mention a few, have voiced their support for the incorporation of IK into the science curriculum. They argue that IK is advantageous for learners in their science education. Furthermore, it has been suggested that integrating IK may enhance learners' engagement in science education (Sedlacek & Sedova, 2013) and facilitate the bridging of the cultural gap between home and school science (Aikenhead & Jegede, 1999). Additionally, Mushanyika and Ogunniyi (2011) regard the integration of IK as a platform for discussing the interaction between Western and indigenous worldviews.

According to Ogunniyi and Ogawa (2008), IK creates a strong connection with day-to-day life, resulting in learners actively engaging in science lessons. Magwentshu (2020) also argues that IK encourages learners to think critically, resulting in the development of critical thinking abilities. Shizha (2009) suggests that learners are more likely to be engaged when they are learning about topics that are relevant to them. Le Grange (2007) and Mukwambo et al. (2014) argue in favour of integrating IK, claiming that it opens doors to authentic Africanisation in the teaching and learning process. Furthermore, they argue that the integration of IK could make substantial contributions to the cultural revalidation of IK. Seehaver (2021) suggests that IK integration should be seen as a strategic cultural tool for addressing current educational challenges.

2.11 Community Elders

Community elders are individuals who are respected and recognised as wise and experienced members of a particular community. They have a deep understanding of the community's history, traditions and cultural practices. Hence, the call to integrate the more experienced indigenous elders to act as custodians of the new role of IK. Indigenous elders can be instrumental in providing science teachers with the necessary tools to incorporate IK into the science curriculum. Kakambi's (2020) study focused on indigenous elders in the field of basketry and weaving to contextualise WS in the context of chemical and physical changes.

In the context of this research, Indigenous elders are referred to as IKCs and are the gatekeepers of cultural heritage. According to Vygotsky (1978), they are the more knowledgeable others (MKOs). Consistent with the indigenous research paradigm, Ubuntu and respect were upheld during the hands-on demonstration of food processing and preservation. Ubuntu is associated with the notion that one is a person 'through other people' (Keane et al., 2016), a concept that is echoed by Khupe (2014) and Ogunniyi (2007a).

This study would not be possible without the support of indigenous elders. To contextualise their learning, learners had to collaborate with indigenous elders by visiting their homes to discuss specific practices of food preservation and processing to mediate the learning of nutrition in the local context. The indigenous elders helped the learners realise how science is intertwined with indigenous practices. Inviting Indigenous elders to designate traditional ways of doing things that might be utilised to illustrate food processing and preservation to mediate learning through nutrition topics in science allowed learners to realise that science can be done outside of the classroom context (Leuhmann, 2009).

Indigenous elders have been actively engaged in various studies (Liveve, 2022; Mayana, 2020; Mutanho, 2021; Simasiku, 2022). This is altering the beliefs of current researchers and encouraging them to collaborate with indigenous people as guardians of various IK, which is beneficial for the teaching of science. It is widely recognised that indigenous practices provide invaluable opportunities for hands-on practical activities, enabling learners to effectively visualise and comprehend scientific concepts tangibly. This understanding of the practical application of traditional knowledge forms a crucial bridge to the forthcoming section, which

will delve deeper into the specific methods and impacts of integrating these experiential learning activities into the science curriculum.

2.12 Hands-on Practical Activities and Visualisation

Practical activities are any form of teaching and learning in which learners are required to observe or interact with the objects and resources they are learning about (Mavuru & Ramnarain, 2020; Millar, 2004). According to Kidman (2011), hands-on practical activities allow learners to test their thinking skills by carrying out small-scale experiments related to areas of their interest. Asheela et al. (2021) further note that hands-on practical activities foster conceptual knowledge of science concepts by encouraging learners to predict, explain, explore, observe and explain when carrying out practical activities. The most effective way for learners to learn is through verbal communication, touch and sight.

Millar (2009) highlights that engaging in hands-on activities prompts learners to inquire and pose questions. In contrast to other science teaching and learning activities, there is evidence, according to Abrahams and Millar (2008) that learners find hands-on practical activities connected to their IK to be relatively beneficial and entertaining. Using knowledgeable community members to demonstrate how food is processed and preserved will allow teachers and learners to observe scientific processes occurring at home and in communities, engaging learners in hands-on practical activities. Dueñas et al. (2022) state that using practical hands-on activities allows for a better understanding of the subject, stimulates learners' curiosity, and improves the receptiveness of the lesson.

While hands-on practical activities are often seen as promising, some scholars question their effectiveness in science classrooms and for learning. Hodson (1990) argues that practical work is frequently misinterpreted and fails to yield the desired results for learners. In response to Hodson's (2009) argument, Asheela et al. (2021) suggest that practical activities should not only involve learners physically manipulating materials but should also prompt them to use their understanding to document scientific concepts, which they can then use to develop mind maps and subsequently progress to concept maps.

Teachers resist the implementation of hands-on activities in the classrooms, according to Asheela's (2017) study, which might be because there are limited, if any, resources or science labs available. To alleviate this problem, Asheela et al. (2021) recommend that teachers use readily available materials in their practice. These scholars believe that the use of readily available materials can stimulate social interaction among learners. Nikodemus (2017) conducted a study in Namibia that demonstrated that hands-on practical activities can be beneficial in facilitating the development of science concepts fusing IK and practices. The study also suggested that hands-on practical activities can be used to facilitate the transition from cultural science to school, as recommended by Aikenhead and Jegede (1999).

The efficacy of hands-on practical activities in science education has been substantiated by Shinana's study in 2019, which advocates for the active engagement of teachers in authentic practical research. This approach emphasises utilising local and cost-effective resources, like *oshikudu*, to facilitate experiential learning. Further expanding upon these findings, Shinana et al. (2021) provide additional evidence supporting this methodology. Their more recent research underscores the significance of integrating practical activities not just for content comprehension but also for fostering critical thinking and problem-solving skills among students.

These activities, grounded in local context and resources, not only make science more accessible but also more relevant to students' everyday experiences. Both studies collectively highlight the transformative potential of hands-on, contextually relevant science education. Mubarok (2020) emphasises that hands-on activities are effective for critical thinking and active social interaction. Furthermore, it is important to recognise that practical activities are presented visually. Consequently, presentations by expert community members in this study have the potential to mediate the learning of scientific concepts through visual representations.

Visualisation is the act of forming visual images in the mind (Vermirosky, 2013). Visualisation is a part of cognitive science that helps us understand abstract concepts and make them visible. According to Rundgen and Yao (2014), visualisation is an important part of science education because it helps us make invisible ideas more visible.

From the perspective of this study, the practical presentations of the IKCs as visual representations can indeed play a pivotal role in mediating the learning of the concept of nutrition for Grade 6 rural school learners. This perspective aligns with the findings of Muvhunga and Rollnick (2013), who emphasise the crucial role of representations as teaching aids that can help learners comprehend the subject matter. Curley et al. (2018) and Okan (2003) also found that integrating visual aids into lessons captured the interest of learners. This underscores the significant influence of visual representations on the way learners conceptualise scientific concepts.

2.13 Concepts Related to Learning

Learning-related concepts are associated with prepositions and beliefs that, taken together, facilitate conception (Maxwell, 2013). In the context of this study, my learning-related concepts were conceptions, dispositions, and sense-making.

2.13.1 Conceptions

Atallah et al. (2010) argue that conceptions are attitudes and beliefs that learners have about a topic such as nutrition. In agreement with Chan (2011), conceptions are understood as the acquisition of knowledge and the alteration of personal beliefs through learning. In simple terms, the level of interest and effort of learners in a subject is contingent upon their perception of science. Such perceptions can indeed enhance knowledge, particularly in relation to cultural attitudes and practices regarding food.

2.13.2 Dispositions

According to Atallah et al. (2003), dispositions can be associated with either favourable or unfavourable attitudes. According to these researchers, both favourable and unfavourable attitudes can have an impact on learning. Crick and Yu (2008) argue that disposition is a long-term behavioural tendency that can be shaped and improved over time. Similarly, according to Graven (2012), a disposition is the habit of behaving in a certain way when presented with a given situation. In the framework of this research, the learners' situation refers to the learning environment in the school setting.

Agunbaide et al. (2017) propose that learners may develop positive attitudes towards science and science-related environments, which aligns with the findings of my study. These scholars argue that both dispositions and attitudes may be used interchangeably, as they both reflect an individual's mindset in a specific situation. In my study, I chose to use dispositions throughout my thesis. Additionally, I adapted Atallah et al.'s (2010) criteria to better understand learners' conceptions and attitudes towards science. Consequently, I aimed to investigate whether there was a shift in learners' dispositions regarding learning during science lessons where traditional knowledge was incorporated.

Asukainen (2013) regrets the fact that research on learners' conceptualisations of learning is limited in the scientific literature. I hoped that this study would help me to understand how my learners' ideas of learning might be affected by using indigenous methods of food processing and preservation to mediate the learning of nutrition.

2.13.3 Sense-making

Wieck et al. (2005) define sense-making as the process of transforming a situation into a concept that is explicitly understood and that is used as a starting point for action. Basically, sense-making is a way to explain what is going on in a way that is easy to understand. To gain a better understanding of how learners create sense, video recordings of their conversations were recorded to observe how they construct meanings from practical demonstrations.

According to Ford (2012), learners must focus on achieving 'understanding'; this serves as the epistemic foundation of scientific assertions. This is achieved through interactions and the construction and criticism of scientific phenomena, as proposed by Vygotsky (1978). In this case, it is achieved by connecting learners to the real world or their life experiences.

Mediational cultural tools are used by learners to make sense of their observations and experiences. Nikodemus (2017) stresses that sense making is the process of materialising meaning, which is an essential component of language, speech and communication. In this study, practical examples of traditional food processing and preservation were presented in the local language, as suggested by Msimanga and Elliot (2014) and Mavuru and Ramnarain (2017), who found that home language aids learners in understanding and making sense of scientific concepts.

2.14 Theoretical and Analytical Frameworks

A theoretical framework is essential for guiding research and shaping data analysis. As emphasised by Bertram and Christiansen (2020), the choice of a theoretical framework is crucial as it significantly impacts the interpretation and understanding of collected data. In this study, Vygotsky's (1978) SCT was employed as the primary framework. This theory, which highlights the influence of social interaction and cultural context on learning, offers a robust perspective for examining how learners engage with and comprehend the educational material presented.

To add depth and specificity to the analysis, I complemented Vygotsky's perspective with the CAT formulated by Ogunniyi (2007a) because Vygotsky focuses on the influence of social interactions and cultural tools on cognitive development. CAT offers a nuanced approach to understanding how different systems of thought – such as IK and Western scientific methods can be reconciled and integrated. This dual-framework approach allows for a more comprehensive analysis, combining Vygotsky's insights into the social dimensions of learning with Ogunniyi's focus on the synthesis of diverse knowledge systems. The application and interplay of these two theories in analysing data will be explored in the following sections.

2.14.1 Theoretical framework: Vygotsky's sociocultural theory

The theoretical framework of this study is Vygotsky's (1978) SCT. Vygotsky's theory describes learning as a social process and as the origin of human intelligence in a society or culture. He believed that learning has a richer meaning when learners learn through social interactions with materials from their cultures. In addition, the sociocultural concept was employed in the study to encompass the broad social and cultural contexts in which individuals engage in the acquisition of knowledge, abilities and attitudes. Vygotsky was more concerned with the social aspects of a learner's acquisition of information in the context of the environment (Liu & Mathews, 2005). Furthermore, learning necessitates that the acquisition of personal knowledge largely takes place through social interaction to negotiate the significance of new experiences (Palinscar, 1998).

Contemporary educational research continues to affirm Vygotsky's (1978) foundational argument that the essence of knowledge acquisition lies in community-driven social connections. Recent scholars, such as Nguyen and Larson (2018) and Patel and Lynch (2021), echo this sentiment, highlighting the ongoing relevance of Vygotsky's theories in modern educational contexts. These scholars reinforce the idea that social interactions and cultural experiences play a significant role in shaping individual knowledge development. Nguyen and Larson (2018) particularly emphasise the role of collaborative environments in facilitating learning, while Patel and Lynch (2021) focus on how cultural contexts shape individual understanding and knowledge construction. This enduring principle underscores the importance of social and cultural influences in the learning process. According to Vygotsky's (1978) theory, learning is a social process that involves understanding human intelligence in a society or culture. It is important to note that this theory is primarily concerned with the learning or development of children (Vygotsky, 1978).

However, Eun (2008) suggests that the scope of learning and development should extend beyond children, emphasising its relevance for both children and adults. This is particularly true in my field of study. Shabani (2016) also asserts that learning in schools is relevant to teachers, supporting their professional development. Drawing from Vygotsky's SCT, I have incorporated concepts such as mediation of learning, culture and language, social interaction, and the ZPD, all of which are discussed below.

2.14.1.1 Mediation of learning

Vygotsky (1978) defined mediation as a tool comparable to cultural artefacts used in cognitive transformation. He further asserted that mediation is the association of a person who actively impedes the learning process. In addition, mediation is the process by which an individual interacts with learners from the social and cultural environment (Boblett, 2012).

In this study, the concept of mediation is regarded as a skill that facilitates the acquisition of learning through social interaction. According to Vygotsky (1978), a child's development of higher mental processes relies on the mediating agents present in their social interaction (Kozulin, 2003). The study used food processing and preservation as a tool to promote interaction among the participants. Furthermore, the use of the local language, isiXhosa, enhanced the participants' engagement in the presentation, as they could freely express

themselves in their native language. As per the concept of mediation, a child's development of advanced mental processes is influenced by the presence of mediating agents in their interaction with the environment.

In this context, a teacher guides the learner to higher levels of cognition by interpreting and attributing meaning to things and events. This critical approach relies heavily on a thorough understanding of the material to be effective. To accomplish this, the mediating tools must align with the learner's requirements and be responsive during the interaction.

2.14.1.2 Culture and language

According to Vygotsky (1978), cultural tools and practices play a crucial role in cognitive development, and learning takes place through social interactions and the use of these tools or practices. Vygotsky further explains that learning is social, rather than individual, and takes place in the context of social interaction with another learner. In the context of this study, the adoption of IK is a reaction to cultural instruments that facilitate the cognitive process.

According to Vygotsky's theory, the process of learning nutrition can be facilitated through the cultural practices of traditional food processing and preservation, as well as through language. The IKCs demonstrate traditional methods of processing and preserving food using their home language.

2.14.1.3 Social interactions

Vygotsky's (1978) definition of learning is that it takes place through social interaction with your peers or people who know you well (e.g., parents, teachers and learners). He goes on to say that social interactions are between different groups of people, interacting with others, and communicating expectations to people who are new to something. Social interaction enables learning to occur either in the context of formal classes or through informal activities that enable the learner with less experience to observe the MKO) during activities. Social interaction between the IKCs and the learners enabled the learners to observe community members processing and preserving traditional food to facilitate learning about nutrition.

Social interactions place learning at the core of SCT. Learning happens through social interaction between people of different levels of expertise, and it is the characteristics and qualities of these individuals that are essential to comprehending the concept of proof learning (Yoom & Kim, 2019). In this study, the social interaction between the IKCs and the learners occurred during the practical demonstrations, when they engaged in both discussions and practical activities. As knowledge is acquired through interactions, this plays a role in the manner in which knowledge is expressed in SCT. Vygotsky's (1978) SCT is based on the idea that the individual is not separable from the social and that the individual is derived from social interactions and, as such, is always essentially a social being.

2.14.1.4 Zone of proximal development

Vygotsky's (1978) definition of the ZPD distinguishes between what a child is capable of doing independently and what a child is able to do without the assistance of an experienced adult. Following Stott (2016), the development zone is the set of skills that a learner possesses that can be employed to address a given issue without the need for external assistance. Conversely, the potential zone is the zone that can be developed with the assistance of a knowledgeable individual or a peer (Stott, 2016).

Vygotsky (1978) delineates the ZPD into three zones: anxiety, learning comfort, and the comfort zone. Anxiety represents what learners believe they can currently accomplish; the learning comfort zone denotes what they can do with the assistance of a more experienced individual; and the comfort zone signifies tasks they can perform independently. According to Vygotsky, collaborative group work has a greater impact on ZPD compared to individual work; the larger the group, the higher the ZPD for each person. Stott (2016) further emphasises that it is not only the learners in the zone who benefit but all participants, including adults.

In this study, expert community members could assist learners in advancing to the most fundamental level of development by helping them comprehend the scientific concepts demonstrated. Additionally, the expert community members themselves could experience a shift in their ZPD as they recognise that their knowledge and experience in food processing and preservation are valued and can be integrated into science lessons.

2.14.1.5 Double stimulation

Double stimulation refers to the cognitive process in which individuals are presented with two conflicting or contrasting stimuli, requiring them to navigate and respond to the dual demands of the information presented (West, 2021). The principle of double stimulation is rooted in the idea that human beings intentionally affect their behaviour and the world around them by creating a strategic setup involving conflicts of motives and two types of stimuli (Sannino, 2015). This strategic setup allows individuals to control and direct their behaviour by using external stimuli to elicit desired reactions (Vygotsky, 1994). In essence, when individuals encounter new information or challenges that are slightly beyond their current level of understanding, they are prompted to engage in problem-solving and critical thinking (Kantowitz, 2021; McDonald, 2017; Saunders & Wong, 2020). This external stimulation, such as exposure to new concepts or tasks, is complemented by the internal cognitive processes and mental strategies that individuals utilise to make sense of the new information and address the challenges they encounter (Kantowitz, 2021; McDonald, 2017; Saunders & Wong, 2020). Importantly, the social support and guidance provided by more knowledgeable individuals or peers play a crucial role in facilitating this process. They can help scaffold the individual's learning by providing explanations and help as needed and enhancing the overall learning experience (Fisher & Shogren, 2012).

In the context of education, the concept of double stimulation underscores the importance of providing opportunities for learners to engage with challenging tasks and new information within a supportive social environment (Barkley et al., 2014; Loh & Ang, 2020; Mahn & John Steiner, 2012). This aligns with Vygotsky's broader SCT, emphasising the interconnectedness of social interaction and cognitive development (Vygotsky, 1978). It highlights the role of collaborative learning, guidance from MKOs, and the cultural context of facilitating learning and problem-solving (Van Leeuwen & Janssen, 2019).

In this study, the concept of double stimulation aligns well with the approach of integrating traditional methods of food processing and preservation to motivate and guide Grade 6 rural school learners. By exposing the learners to new and culturally relevant experiences within a supportive social context, such as through the guidance of IKCs and community members, the concept of double stimulation can be applied. This can prompt the learners to engage in critical

thinking and problem-solving, leading to enhanced cognitive development and a deeper understanding of nutrition and traditional food practices within their cultural context.

2.14.2 Analytical framework: Contiguity argumentative theory

In this study, I augmented Vygotsky's SCT with Ogunniyi's CAT as the analytical framework. According to Ogunniyi (2007a), CAT is grounded in the idea that distinct systems of thought, such as IK and WS, interact to construct a meaningful understanding. Additionally, CAT asserts that science and IK are interdependent, and their interrelation contributes to the creation of meaningful knowledge (Ogunniyi & Hewson, 2008). Effective communication of meanings between these systems is essential for their integration (Ogunniyi, 2007a).

The CAT outlines five categories that elucidate how conceptions evolve in a learner's mind. It also delineates how conceptions traverse among learners engaged in dialogues that require the utilisation of scientific and/or indigenous knowledge-based conceptions. The five cognitive categories are (1) dominant conceptions, (2) suppressed conceptions, (3) assimilated conceptions, (4) emergent conceptions, and (5) equipollent conceptions (Ogunniyi, 2007a).

The concepts of dominance, suppression, assimilation, emergence and equipollence in the CAT offer valuable insights into the evolution of mental states in various situations, and show how conflicting ideas or worldviews coexist in the mind. A dominant conception may be adaptable in one context but suppressed or assimilated in another. An emergent conception arises when new information is required due to a lack of prior knowledge, while an equipollent conception occurs when conflicting ideas hold comparable intellectual influence without causing conflict (Govender, 2014; Ogunniyi & Hewson, 2008). In the context of this research, these five CAT conceptions were anticipated to provide insight into the perspectives of both learners and expert community members regarding the integration of IK in nutrition-related science lessons. This approach aimed to analyse how these individuals perceive and reconcile different knowledge systems in the learning process, ultimately contributing to a more comprehensive understanding of the topic.

Mashoko (2018) argues that the CAT framework was developed to capture learners' experiences outside the school environment. This is indeed echoed by this study, which focused on how traditional food processing and preservation enables and/or constrains the motivation

of Grade 6 rural school learners to learn science and mediates nutrition learning. This theory was important for this study because it contains a type of argument that focuses on the study of cognitive-perceptual changes in the integration of IK in school science (Mashoko, 2018).

In this light, Siseho (2013) claims that argumentation is a tool to resolve conflicting ideas and allows participants to exclude their positions and clarify doubts. Govender (2014) agrees that there is a reasoned discussion that is culturally significant (Mhakure & Otulaja, 2017) where learners create a perspective on knowledge that can be fresh and useful in their classrooms. Govender (2014) states that, in most cases, the cultural or indigenous experiences of African learners are not considered in science classrooms. This exclusion of learners' cultural or indigenous experiences makes learning science difficult if they do not make connections and understand what is being taught (Govender, 2014).

Other researchers, such as Mhakure and Otulaja (2017), agree with Govender that WS must be integrated into IK. This made me interested in using Ogunniyi's CAT. In conclusion, these two theories are complementary. CAT was used in this study to analyse the thoughts generated during the social interactions suggested by Vygotsky (1978). I believed this would help me understand the learners' contributions during social interaction in group activities, presentations by IKCs and what they report in their journals. Therefore, SCT and CAT were important theoretical and analytical frameworks for this study.

2.14.3 The rationale for combining Vygotsky's SCT with Ogunniyi's CAT

This study utilised the combined strengths of SCT and CAT to systematically investigate how Grade 6 rural school learners gain knowledge about nutrition through traditional food practices. On one hand, SCT emphasises learning as a social and cultural process. It thus served as the basis for understanding of how interactions with more knowledgeable other, such as the IKCs in this study, influence learners' understanding. Essentially, SCT illuminated how learners, through observing and engaging with IKCs during presentations on traditional food processing, acquired new vocabulary and conceptual understandings related to nutrition.

In addition, acknowledging that learners do not passively absorb knowledge, CAT was integrated to specifically address the transmission and negotiation of cultural knowledge. This is central to understanding how learners integrate the IKCs' teachings into their existing

knowledge. Moreover, during focus group interviews (sharing circles), CAT helped me to analyse how learners discussed and potentially contested traditional food practices shared by the IKCs, ultimately shaping their understanding of nutrition within their cultural context. These combined frameworks, therefore, enabled for a nuanced analysis of how learners actively construct knowledge through social interaction and engagement with traditional practices, revealing a dynamic interplay between cultural knowledge and individual understanding.

2.15 Chapter Summary

Chapter Two provided a comprehensive review of the literature related to key concepts central to the research topic. The chapter reviewed literature about the significance of traditional food processing and preservation practices in the context of nutrition, highlighting the cultural and nutritional relevance of these methods, particularly within rural communities. It also addressed the importance of nutrition and the understanding of traditional food practices in promoting healthy dietary habits and preserving cultural heritage.

Furthermore, the review provided insights into IK from a South African perspective, emphasising the rich cultural wisdom and traditions associated with food processing and preservation, while also exploring the challenges of integrating IK into science lessons. The chapter acknowledged the complexities and potential barriers to incorporating traditional knowledge into formal educational settings.

Lastly, the chapter delves into theoretical and analytical frameworks, particularly Ogunniyi's CAT and Vygotsky's SCT, which emphasise the role of social interactions, cultural context, and the ZPD in cognitive development. The concept of double stimulation was also discussed, highlighting its relevance in facilitating learning and problem-solving within a sociocultural context.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

Research methodology refers to the strategy and rationale behind the approach a researcher takes in conducting research. It encompasses the methods and procedures used to collect and analyse data, playing a critical role in ensuring the validity and reliability of a study's findings (Creswell, 2014). This study aimed to mediate the learning of nutrition among Grade 6 learners in rural schools through traditional methods of food processing and preservation. Accordingly, this chapter delves into the methodology used, including the research paradigm, design, site, participants, data collection methods and considerations of validation, trustworthiness, and ethics.

3.2 Research Paradigm

The study's foundation is the interpretivist paradigm. Bertram and Christiansen (2020) note that interpretivists seek to understand the social world by studying people's beliefs, values and experiences. This paradigm was apt for this study as it facilitates a deep understanding of the learners' perspectives and experiences in the context of traditional food processing and preservation. Cohen et al. (2018) emphasise that the interpretivist approach is key to understanding human activities' subjective aspects, making it ideal for exploring how learners conceptualise nutrition within this framework.

In this research, a combination of interpretivist and indigenous paradigms is employed. The interpretivist aspect allows for a comprehensive understanding of learners' and educators' viewpoints on nutrition education through traditional methods (Bertram & Christiansen, 2020; Thomas, 2013). Meanwhile, the indigenous research paradigm, advocated by Chilisa (2012) and Seehawer (2021), was integrated to examine the scientific principles behind traditional knowledge of food processing and preservation, as conveyed by the IKCs.

3.2.1 Interpretivist paradigm

Thomas (2013) avers that the essence of interpretivism is to understand the worldviews of participants and how we can interpret and comprehend them. Concurring, Bertram and Christiansen (2020) explain that an interpretivist paradigm tries to understand the social world including human agency, behaviour, attitudes, beliefs and conceptions from the individuals' perspectives. From this point of view, this paradigm was well-suited to understand the participants' human experience, behaviour and attitudes (Bertram & Christiansen, 2020).

The main goal was to get an idea of how learners felt, how they acted, and what they thought about using the old ways of processing and preserving food before and during the study (Cohen et al., 2018). An interpretivist paradigm, however, has been criticised in terms of the possibility that the researcher may take an interpretation based on their own experience rather than that of the participants (Creswell, 2007). To address this limitation, I supplemented the interpretivist paradigm with the indigenous research paradigm (Chilisa, 2012; Seehawer, 2021).

3.2.2 Indigenous research paradigm

The Indigenous research paradigm takes into consideration perspectives and methods that draw from IK, languages, metaphors, worldviews, experiences and philosophies of the historically marginalised people (Chilisa, 2012). This is intended to centre other ways of knowing which were denigrated by colonialism and apartheid in the context of South Africa. Within the Indigenous research paradigm, I focused on the Ubuntu perspective.

According to Seehawer (2023), Ubuntu is the spirit of togetherness. Ubuntu is regarded as kindness towards one another as Africans where we say '*umntu ngumntu ngabantu*' (a person is a person because of others). To Mkabela (2015), the Ubuntu perspective focuses on indigenous African cultures and is appropriate for research that pursues explanations and solutions to alleviate problems faced by Africans. The Ubuntu perspective also emphasises indigenous African culture for the study of African behaviour (Mkabela, 2015) in the colearning process underpinning this intervention.

This research was based on the indigenous research paradigm developed by Chilisa (2012). This research used the indigenous research paradigm to gain insight into the knowledge of indigenous elders that applies to natural sciences lessons. The methodology enabled me to collaborate with the IKCs and learners. In addition, the indigenous research paradigm allowed us to challenge the WS and encourage the integration of IK. The science curriculum was a key part of this research, as it was used to contextualise research methodologies.

Contextualisation of the science curriculum necessitates the inclusion of African epistemologies in IK teaching (Seehawer & Bredlid, 2021). Indigenous epistemology is based on the idea of ‘two-eye-seeing’ which means that you learn by using one eye to understand the strengths of Western ways of knowing and using both eyes in this study to understand the strengths of WS and IK (Hatcher et al., 2009). In this research, I used ‘two-eye-seeing’ to help me work with IKCs and the learners to figure out how IK can be integrated into science. I was inspired by Seehawer (2021) who worked with science teachers to integrate IK into science lessons. The utilisation of IK research paradigm challenges negative perceptions and pathologizing descriptions of formerly colonised individuals. Instead, it reconstructs a knowledge framework fostering hope and inspiring social change among oppressed communities (Seehawer, 2021).

In this study, indigenous elders are regarded as IKCs as they have acquired knowledge through observation, *storytelling*, cultural music and practical activities on how to process and preserve food using traditional ways from their grandparents. This knowledge was used to help learners understand the role of IK in science learning and teaching. The indigenous research paradigm had a significant impact on the way research was conducted in the context of the living environment of the IKCs, for instance, when visiting the IKCs in their homes with learners to learn and engage with indigenous knowledge that is done within the community. That knowledge could be applied to science learning and teaching contexts. It is also important to remember that IK is different depending on the community.

In addition, this research included IKCs as the stewards of cultural heritage. As such, the indigenous research paradigm was relevant as it combines culture, language and IK. Indigenous knowledge (IK) was held as a complement to WS, not a substitute, during the traditional food processing and preservation science lesson. The purpose of my study was to use these paradigms to comprehend the situation and to understand the interpretation of meanings in the social and cultural environments of the research study. Within the interpretive and indigenous paradigms, this study used the case study research design.

3.3 Research Design

Cohen et al. (2018) explain that a research design is a plan or strategy that is drawn up for organising the research and making it practicable so that the research questions can be answered based on evidence. Concurring, Bertram and Christiansen (2020) also define a research design as a plan of how the researcher will systematically collect and analyse the data that is needed to answer the research question. In this study, I employed a qualitative case study research design.

3.3.1 Case Study

Cohen et al. (2018) define a case study as a detailed phenomenon under close consideration focused on practice, intervention and interpretation intending to improve a situation. A case study means that a researcher observes a particular issue in depth, rather than looking at multiple instances superficially. A case study research design was employed to understand and gain in-depth information about how knowledge is integrated into science classrooms to make meaning. Bertram and Christiansen (2020) explain that a case study allows deeper study and provides a full understanding of a particular lived experience of participants.

The study employed a qualitative case study research design that used a participatory approach, emphasising collaboration and active involvement of the participants in the research process (Vaughn & Jacquez, 2020). This study employed a participatory case study design, which emphasises collaboration and active involvement of participants in the research process (Vaughn & Jacquez, 2020). In this approach, researchers and participants work together to define research questions, collect and analyse data, and interpret findings (Collins et al., 2018; De Oliveira, 2023). This study focused on the collaborative exploration of traditional food processing and preservation practices with Grade 6 rural school learners in the Eastern Cape

Province. This approach was chosen to maximise the active involvement of both learners and Indigenous Knowledge Custodians in shaping the research process and knowledge generated. A participatory framework aligns with the study's aim to understand the complexities of integrating traditional food knowledge into nutrition education within a specific cultural context.

Rather than seeking broad generalisations, this study prioritised an in-depth understanding of the unique characteristics of this particular setting. This includes recognising the learners' existing knowledge, experiences, and socio-cultural backgrounds (Mavuru & Ramnarain, 2020), as well as the invaluable insights provided by the IKCs. By working directly with these key stakeholders, the research aimed to uncover how traditional knowledge can be respectfully and effectively mobilised to enhance the learning of nutrition for these Grade 6 learners.

The case study helped me to create dense descriptions of the Grade 6 Natural Science learners as well as the IKCs' opinions and experiences on the use of traditional processing and preservation of food. Complex social activities such as traditional processing and preservation of food by the learners can be better understood in a case study as it complements the description of the case and provides another dimension of the investigation. The purpose of the case study was to investigate the case where learners are exposed to IK practices. The case participants were restricted by the fact that all Grade 6 NS learners had previous exposure to traditional food processing and preservation, having learned about it in their upbringing. Therefore, the case study was considered suitable for this study because it provided the participants and me with a deeper understanding of the phenomenon being investigated.

To provide further context, this case study examined the learners' experiences within the science classroom, which included their interactions and engagement with each other and with the IKCs during presentations. This case was conducted with Grade 6 Natural Sciences learners and IKCs. The main unit of analysis was the motivation to study science by the learners and how they make sense of it. This case study followed the same approach as Seehawer's (2018), in which participants were invited to corroborate with elders or IK holders. Learners were then taken to the IK holders' locations to gain knowledge or observe traditional practices. Research indicates that parental involvement in children's

science learning outside the school setting plays a vital role in enhancing their interest and ability in science.

The National Science Teachers Association (NSTA) emphasises that active parental engagement in children's learning leads to greater academic success, irrespective of socioeconomic status, ethnic background or parents' education level (NSTA, n.d.). This involvement results in increased confidence and engagement in children, positively affecting their academic achievements (Cotton & Wikelund, 2001). Moreover, engaging children in science activities outside of school is linked to long-term interest in STEM fields, influencing their knowledge, interest, and future academic choices (McDonald et al., 2023).

Essentially, activities that foster observation, questioning, experimentation, and exploration of natural and human-made phenomena are crucial. They encourage learners' creative and critical thinking, problem-solving, and resourcefulness, integral to science learning and the development of scientific literacy. These findings align with the approach of involving parents and community members in science education, as seen in the case study model by Seehawer (2018), where learners engaged with their parents and IKCs outside the school environment. This approach facilitates a practical and in-depth understanding of scientific concepts, highlighting the significance of the community's role in education.

The study was further informed by Chikamori et al.'s (2019) Transformative Model of Education for Sustainable Development (TMESD) framework, which was found to be suitable for the study as it focused on the design and implementation of IK integrated into science lessons by inviting community members as stewards of IK to contribute to the science taught in the science classroom. In essence, the invitation of IKCs is in line with the TMESD model, as it focuses on the transformation of society, whereby parents become cognizant of what is happening in the classroom, and how their knowledge can benefit the learners. This also encourages the learners to contemplate their learning processes and formulate appropriate recommendations to enhance them.

The TMESD is a framework of learning that is based on three processes, namely, ‘knowing the present’, ‘past-present relationships’ (*focusing on the dependence of the present on the past*) and the ‘future-present’ (Chikamori et al., 2019). These researchers refer to the practices of examining the relationship between past and present as *retroduction* and future-present relations as *retrodiction* (see Figure 3.1).

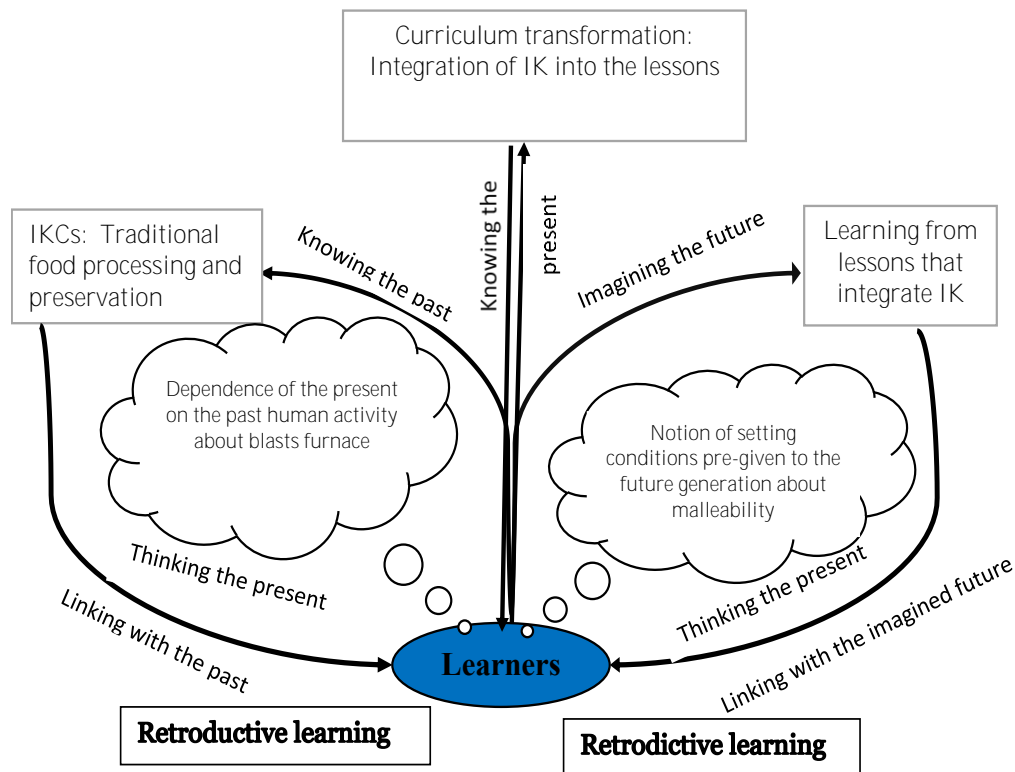


Figure 3.1: Shows the IK-science integration process (adapted from Chikamori et al., 2019, p. 9)

The first part of the study focused on the past to understand the practices of traditional food processing and preservation. In the second part, IKCs presented the cultural practices of food processing and preservation related to the topic of nutrition. This gave learners a chance to learn about food processing and preservation that was in the past. The third part of the study related to the integration of IK into a science lesson on nutrition. This was done to make science relevant and reachable to learners. Journal reflections and focus group interviews were used to see how learners felt about the integration of IK when it came to nutrition.

3.3.2 Research goal and research questions

The purpose of this study is outlined below. To meet the purpose of the study, one must have questions that will make that happen. Below, I outline the goal of this study and the research questions that drove this study.

3.3.2.1 Research goal

The main goal of this interventionist study was to mediate learning of nutrition through traditional food processing and preservation.

3.3.2.2 Research questions

1. What knowledge of traditional food preservation and processing do Grade 6 rural school learners know from their homes and community?
2. How do the presentations by the IKCs on traditional food processing and preservation and consolidation thereof enable and/or constrain Grade 6 rural school learners from talking about and making sense of the topic of nutrition?
3. How does an exemplar lesson that integrates traditional ways of processing and preserving food enable and/or constrain Grade 6 rural school learners from talking about and making sense of the topic of nutrition?

3.3.3 Research site

This study was carried out at a government primary school in a rural area in the OR Tambo Coastal district in Port St. John's. The school has an enrolment of about 153 learners from grades R to 9. Most learners come from rural areas and have different social and cultural backgrounds (Mavuru & Ramnarain, 2020). For instance, most of the learners come from areas that are very poor and only rely on social grants. The school uses English as the language of instruction following the requirements of the national educational policy.

The school is constructed of brick and consists of 10 classrooms and a hall designated for Grade R. It is staffed by six personnel, including a departmental head and a principal, and has a teacher-learner ratio of 1:30. The departmental head oversees all grades. Unfortunately, the school does not have a science laboratory, however, I used the school's natural resources. In addition, our learners also took part in the Makhanda Scifest and

demonstrated an interest in science. In this context, I was motivated to conduct my research at my school to provide educational opportunities regarding nutrition to Grade 6 rural school learners through traditional food processing and preservation that enables and (or) constrains the learning of nutrition.



Figure 3.2: Map of the Eastern Cape with OR Tambo Coastal District where the study occurred (Wikimedia.org/Wikipedia)

3.3.4 Sampling and Participants

Sampling refers to the process of finding and recruiting participants to participate in a study. For example, the learners that I taught at the time of the study, a teacher and two IKCs all took part in this study. I will discuss them below.

3.3.4.1 Learners and teacher

In Bertram and Christiansen’s (2020) definition of sampling, they explain that the researcher makes certain decisions about which people or groups to include in a sample for a specific purpose. The study involved 15 Grade 6 learners from a rural school, consisting of seven boys and eight girls. All Grade 6 learners studying Natural Sciences and Technology, where the topic of nutrition is integrated, were invited to participate. Participation was voluntary, and informed consent was obtained from both the learners and their parents/guardians. The final sample of 15 learners was determined based on those who provided consent, ensuring ethical considerations were met while maintaining a representative sample of Grade 6 learners engaged in the relevant curriculum.

Another participant in this study was my critical friend named Majola (her clan name), who was responsible for Technology, as I was the sole science teacher at school. A critical friend is a trusted colleague who provides constructive feedback and challenges assumptions to enhance the quality of work. According to Costa and Kallick (1993), a critical friend's role is to improve the quality and integrity of research through honest supportive critique and promoting reflective practices. My critical friend attended all presentations on traditional food processing and preservation to mediate learning of nutrition. She also observed lessons integrating IK, took notes and videotaped during both presentations and collaborated with me in data analysis. We both gained significant insights from the IKCs' presentations on various cultural methods of food processing and presentation.

3.3.4.2 Two Indigenous Knowledge Custodians

Two IKCs (female and male) from the surrounding school community were involved. Community members were chosen based on how much cultural knowledge they had to share and how eager they were to show it to learners. Presentations were done in their native languages, isiXhosa and isiMpondo which were the languages they spoke. A critical friend provided a translation of some of the text as it was in the isiMpondo language, allowing me to comprehend what was being presented.

Indigenous knowledge (IK) may have lost its value due to the translation of the original language into English making it more of an artefact rather than a subject (Shizha, 2007). The expert members of the community are the conservators of cultural heritage, who are well-versed in the local knowledge. This is confirmed by Vygotsky (1978) and is reflected in the profiles of the IKCs in Table 3.1.

Table 3.1: Profile of the two expert community members

Biography information	Category	Community member
Age	95	Mathawuzela
	89	Thoyana
Gender	Female	Mathawuzela
	Male	Thoyana
Cultural background	isiMpondo	Mathawuzela
	isiMpondo	Thoyana
Home language	isiMpondo /isiXhosa	Mathawuzela
	isiXhosa /isiMpondo	Thoyana
Highest standard passed	Sub-A	Mathawuzela
	Standard 4	Thoyana

Table 3.1 shows the profiles of the two IKCs I visited to present the traditional methods of processing and preserving food. The purpose of the presentations was to provide an opportunity to present their cultural backgrounds and knowledge of traditional food. The traditional knowledge from the presentation of the IKCs was then used to mediate learning the topic of nutrition. Both IKCs (Mathawuzela and Thoyana) wanted to get their names printed in this study because they wanted to motivate and mobilise other members of the community to collaborate with schools and impact traditional knowledge.

Mathawuzela (clan name) was an elderly midwife from the *kwaNtsila* community; she did not attend school (no formal education), but she did attend ABET for a day and never went back. Thoyana (clan name) completed standard 4 as the highest standard. He attended sub-A at the age of 14 years after he had seen other learners going to school. He was respected in the community as the eldest member and church priest. Both presentations kept learners interested and engaged as they wanted to know if science was integrated into traditional

practices. Video recordings of the presentations by participants and the IKCs were made in this study, using data generation techniques to aid in the triangulation of data.

The two Indigenous Knowledge Custodians were identified through a collaborative process involving the respected community elders. Recognising the importance of selecting individuals with deep-rooted knowledge and a passion for sharing traditional practices was done in consultation with the elders. They identified potential elders renowned for their expertise in traditional food processing and preservation methods. These individuals were then approached, and their willingness to participate and share their knowledge with the learners was confirmed. This selection process ensured that the chosen IKCs were not only knowledgeable but also respected members of the community, reflecting the cultural values and traditions relevance to the study.

3.3.5 Data-gathering methods

To provide a comprehensive response to my research questions, I employed a range of data collection techniques in this study, including group activities, participatory observation, learners' journal reflections and focus group interviews (sharing circles). Cohen et al. (2011) point out that a wide range of data collection methods allows for the collection of comprehensive data, thus providing a researcher with the opportunity to cross-reference the data.

3.3.5.1 Group activities

In the group activity component of the study, I drew inspiration from the methodologies used in Mayana's (2020) and Nuntsu's (2020) research to create a conducive learning environment. This approach aligns with Sedlacek and Sedova's (2017) emphasis on creating safe spaces for minors and Vygotsky's (1978) theory on social interactions as a crucial aspect of learning. The learners were divided into three mixed-gender groups of five and were tasked with exploring local cultural heritage and traditional methods of food processing and preservation.

Each group was given a unique name and assigned roles such as a scribe and a reporter, enhancing the structure and organisation of the activity. The learners had approximately 15–20 minutes to discuss a set of predetermined questions related to traditional food processing and preservation practices. The questions were as follows:

1. What are some traditional practices that you know from your home or community that are related to food processing?
2. What are some traditional practices that you know from your home or community that are related to food preservation?
3. What are modern ways of processing and preserving food?

These discussions went beyond the anticipated time by an additional 30 minutes, indicating a higher level of engagement and interest than initially expected. Notably, the dynamic of the discussions mirrored Ogunniyi's (2007a) findings on the value of argumentation in learning. The learners actively engaged in debates, confidently voicing their opinions and showing a willingness to consider the perspectives of their peers. This level of engagement was a pleasant surprise, demonstrating their deep engagement with the topic and their ability to articulate and defend their viewpoints. The outcomes of these group activities were documented on newsprint and presented to the class, which not only served as a record of their discussions but also provided a platform for further debate and learning. This method of documentation and presentation proved effective in capturing the learners' insights and reflections on the subject matter.

The duration of the group activities, including the additional time taken, was crucial in allowing a comprehensive exploration of the topics. Learners were considered as co-researchers in this study, as they had the opportunity to get a deeper understanding of the traditional processing and preservation of food associated with their cultural practices in their community. This aligns with the SCT of Vygotsky (1978), which is the theoretical framework I chose for this study. I noted that learners' involvement and engagement were very high throughout the process. The group activity's data led to the development of a lesson plan that integrated IK. So, I carefully prepared a lesson plan and delivered it to the class, with the critical friend observing. Carefully planning the lesson plan allowed me to gain a deeper understanding of IK concerning nutrition. In addition, the learners' interest and their request to extend the activity beyond the agreed time showed their enjoyment and positive attitude towards learning. This experience provided me with an appreciative understanding.

3.3.5.2 Participatory and lesson observations

In the participatory and lesson observation phase of the study, I employed the method defined by Cohen et al. (2018) and further elaborated by Bertram and Christiansen (2020). This approach allowed me to immerse myself in the educational environment and observe first-hand the interactions and learning processes of the learners and IKCs. The focus was specifically on how learners engaged with and absorbed the presentations on traditional methods of food processing and preservation by the IKCs.

Following the focus group interviews, I conducted follow-up observations. These observations were crucial in assessing the impact of the focus group discussions on subsequent learner engagement. During these sessions, I noticed a marked increase in participation from learners who had previously been less vocal. They not only paid close attention but also actively asked questions, indicating a deeper engagement and curiosity about the topics presented. All sessions were recorded with the consent of the IKCs, allowing for repeated viewing and analysis of the interactions. This recording process was vital for capturing tones that might have been missed during live observation. The critical friend, responsible for videotaping, played a significant role in ensuring that all aspects of the interactions were captured.

In addition, learners and my critical friend were asked to reflect on their experiences. This reflective component was important for understanding the learners' perspectives and gauging the depth of their learning. The culmination of this observation phase was a model lesson that I delivered, synthesizing the key concepts of food processing and preservation. This lesson, detailed in Appendix F, was designed to consolidate the learning and observations gathered throughout the study.

In terms of duration, each observation session varied depending on the length of the IKCs' presentations and the ensuing discussions. However, the average duration was approximately 45– 60 minutes per session. This time frame was sufficient to capture a comprehensive view of the learners' engagement and interaction with the content and the community members. The extended duration of these sessions was particularly beneficial in allowing for a thorough and unhindered exploration of the subject matter.

3.3.5.3 Focus group interviews (sharing circles)

In the focus group interviews, a key component of the study's data-gathering methods, I employed an in-depth interviewing technique as defined by Bertram and Christiansen (2020) and Thomas (2013). This approach was specifically chosen for its capacity to create a non-threatening and relaxed atmosphere, essential for encouraging open and honest communication among the learners. The groups, each comprising five learners with balanced gender representation, were carefully structured to facilitate a diverse range of perspectives. During these interviews, I implemented the “sharing of circles” approach, aligned with Chilisa (2012) and Lavallee (2009) as well as the use of clan names, resonating with the Ubuntu perspective. This cultural sensitivity proved instrumental in allowing learners to express themselves in a manner that was both comfortable and familiar to them, thereby enriching the quality of the data collected. Each session lasted approximately 60 minutes; a duration that was found to be optimal for maintaining the learners' engagement while allowing sufficient time for all participants to contribute. The use of both English and isiXhosa in these interviews facilitated inclusivity and ensured that language barriers did not hinder the learners' ability to express their thoughts and experiences regarding traditional foods.

However, I noted the potential for more vocal participants to dominate the conversation, potentially suppressing the contributions of quieter group members. To address this, I ensured a rotation in the order of responses, allowing for a more equitable distribution of speaking opportunities. This strategy proved effective in mitigating dominance issues and promoting a more balanced group dynamic.

The focus group interviews were conducted in a school setting in the afternoon, providing a familiar and comfortable environment for the learners. The absence of a critical friend in these sessions further contributed to a setting where learners felt at ease to share candidly. The recorded interviews now served as a rich data source, reflecting the nuanced perspectives of the learners on the integration of traditional knowledge into their science education.

3.3.5.4 Learners' Journal Reflections

Incorporating learners' journal reflections was a pivotal aspect of the data generation process in this study. Inspired by Mayana (2020), I asked the learners to record their reflections in journals at the end of the study, providing them with four specific questions (detailed in Appendix G) to guide their thoughts. This method aligns with the approach suggested by Macmillan and Schumacher (2014), who emphasise the significance of journaling in reflecting on personal experiences and consolidating acquired knowledge and skills.

Prior to the formal start of this reflection process, I cultivated a culture of journal writing within the classroom, drawing on my own lesson experiences and paralleling the method used by Mayana (2020). This preparatory step involved encouraging learners to write reflections after each lesson and share them with their peers, thus promoting a habit of reflective practice. Importantly, learners were given the freedom to write in any language they felt comfortable with, ensuring inclusivity and genuine expression of their thoughts and experiences.

The reflections collected from these journals formed an essential part of the study's dataset. They provided invaluable insights into how the presentations by the IKCs impacted the learners' understanding, attitudes and conceptualisation of the integration of IK into science lessons. This method was especially effective in capturing the learners' evolving perceptions and the depth of their learning experience.

Regarding the duration, learners were given a week following the conclusion of the study to complete their journal entries. This timeframe was chosen to allow them ample opportunity to reflect deeply on the entirety of their experiences and the knowledge gained throughout the study. The week-long period also provided sufficient flexibility for learners to engage with their reflection processes without feeling rushed, thereby enhancing the quality and authenticity of their responses.

Table 3.2: Shows a summary of the data-gathering techniques used in the study

Stage	Method to be used to gather data	Purpose	Research questions
Stage 1	Focus group interview (sharing circle)	To find out learners' limitations and restrictions in learning the topic of nutrition. To find out learners' reactions after the presentation by the IKCs.	1 & 3
Stage 2	Group activity	To find out learners' prior knowledge. To find information from the local community about traditional ways of processing and preserving food.	2
Stage 3	Participatory and lesson observations	To find out the effect of integrating IK into science lessons. To see how learners interact, talk and make sense of learning during the presentation by the IKCs.	2&3
Stage 4	Journal reflections	To find out the influence of practical demonstrations by the IKCs and the lesson that integrated IK into science teaching.	2 & 3

3.4 Data analysis

Bertram and Christiansen (2020) describe data analysis as a process of bringing order and reducing a large amount of data to make sense of it. According to Cohen et al. (2018), the focus of data analysis is on the relevance of in-depth, context-specific, rich and subjective data from subjects in a particular situation, with participants themselves as primary research tools. Qualitative data analysis was employed in this study, in which data from group activities, participatory observation, learners' journal reflections and the focus group interview (sharing circle) were cross-referenced and compared.

Data analysis was conducted using thematic analysis, a qualitative approach employed to identify, analyze, and report patterns (themes) within data (Braun & Clarke, 2017). This method is particularly useful for examining how different people make sense of their

experiences and how these experiences are shaped by social and cultural factors (Peel, 2020). In addition to the six steps of thematic analysis outlined by Braun and Clarke (2006, 2017), this study integrated the five components of CAT as an analytical tool: dominant, suppressed, assimilated, emergent, and equipollent ideas, as well as SCT principles, which provided a framework for understanding how social interactions and cultural tools shape learning. This integrated approach involved the following steps:

1. **Familiarisation with the data:** This initial step involved immersing myself in the data collected through various methods. I repeatedly read and reviewed the learners' newsprint creations from the group activity, the transcribed stories derived from the video recordings of IKCs' presentations, the transcribed notes from focus group interviews, and the field notes taken during these interviews. During this immersion, I remained attentive to SCT's emphasis on social dynamics and cultural context, looking for instances where these factors might be influencing learners' understanding of nutrition.
2. **Generating initial codes:** Guided by both SCT and CAT, I systematically worked through the data, identifying and coding interesting features related to learners' perceptions, dispositions, and the mediation of learning nutrition. Drawing upon the CAT framework, codes were assigned to segments of data that indicated dominant ideas (widely accepted views on nutrition), suppressed ideas (alternative perspectives that were silenced or marginalised), assimilated ideas (integration of traditional and modern knowledge), emergent ideas (new understandings that arose from the interaction), and equipollent ideas (occurrences where traditional and modern knowledge were valued equally). Simultaneously, SCT informed my coding by prompting me to consider (1) *social Interactions*, Instances where learners' understanding was influenced by interactions with peers, IKCs, or myself as the researcher and (2) *cultural Tools*: evidence of learners using language, traditional practices, or other cultural tools to make sense of new information.
3. **Searching for themes:** Building upon the initial codes, I then grouped codes with similar meanings together, forming broader themes. This process involved identifying connections and relationships between different codes across the various data sources. For instance, codes related to learners' positive attitudes towards traditional food practices, identified from their newsprint contributions and interview responses, could

be grouped under a theme such as ‘Appreciation for Indigenous Knowledge’. Throughout this process, both SCT and CAT provided frameworks for understanding the emerging relationships between codes. SCT encouraged me to consider how themes might reflect the social construction of knowledge within the learner group, while CAT guided me to analyze how themes represented the interplay between dominant and marginalized knowledge systems.

4. **Reviewing themes:** The identified themes were then reviewed and refined to ensure they accurately reflected the nuances within the data. This involved revisiting the coded data extracts and making adjustments to the themes, merging or splitting them as needed to ensure coherence and clarity. Both SCT and CAT continued to inform this process, prompting me to consider:
 - *Social Dynamics:* Did any themes need further refinement to fully capture the influence of social interactions on learners' understanding?
 - *Cultural Context:* Were there any cultural nuances within the themes that needed to be more explicitly articulated?
 - *Knowledge Integration:* Did the themes accurately reflect the complexities of how learners were integrating traditional and modern knowledge?
5. **Defining and naming themes:** Each theme was then given a clear and concise definition, capturing its essence and significance in relation to the research questions. This step involved carefully considering the language used to represent the themes, ensuring they were relevant and meaningful within the context of the study and aligned with the insights offered by both SCT and CAT.
6. **Producing the report:** Finally, the findings of the thematic analysis were presented in a clear and engaging manner, supported by rich and illustrative extracts from the data. This report highlighted the key themes identified, their significance in relation to the research questions, and the insights they provided into the integration of Indigenous Knowledge in teaching nutrition.

By employing this systematic and rigorous approach to thematic analysis, informed by both SCT and CAT frameworks, I aimed to provide an inclusive and nuanced understanding of how the integration of Indigenous Knowledge influences learners' perceptions, dispositions, and the mediation of learning nutrition.

3.5 Validity and Trustworthiness

In addressing the validation process of this qualitative research, it is pivotal to acknowledge the insights of Creswell (2014), who emphasised that validation in qualitative research is characterised by the credibility of accounts, content and interactions throughout the study. To ensure the reliability of the data collected in this study, a diverse array of data collection techniques was employed. These included a focus group interview (sharing circle), group activities, observations and journal reflections as the method of triangulation.

Further enhancing the validation process, this study's seminal work was presented at both the SAARMSTE Conference and the SAARMSTE EC Chapter Colloquium. The opportunity to present and discuss the research findings in these academic forums played a crucial role in the validation process. The feedback and critique received from fellow researchers and academics in these settings provided an external check on the research methods and findings. This process of peer scrutiny and engagement is a vital component of validation in qualitative research, as it offers an avenue for the researcher to test the study's findings and interpretations against the perspectives and expertise of others in the field.

Such presentations not only contribute to the credibility and rigour of the research but also ensure that the study's findings are robust and reliable and contribute meaningfully to the existing body of knowledge. The inclusion of these academic presentations as part of the validation process highlights the comprehensive and meticulous approach taken to ensure the integrity and validity of the research findings.

3.6 Ethical Considerations

Before the research was carried out, as a researcher I had to follow the ethical considerations as set out by Rhodes University's Faculty of Education and complete an Ethical Approval Application with the Education Higher Degree Committee along with my research proposal. On the form, I outlined my ethical part based on the following principles: respect, dignity, transparency, accountability, responsibility, integrity and academic professionalism. I followed these ethical principles throughout the research. Data collection and analysis needed to be reliable, verified and triangulated.

After that, I wrote several letters to the gatekeepers of the Eastern Cape DoE and the school principal informing them about the purpose of the study and how would benefit the learners. The process went on to the learners' parents and guardians as they were minors and two IKCs. The role of the participants and IKCs was made clear in that they would take part in the following activities: participatory observation, group activity, focus group interview and learners' journal reflections. All these activities would be videotaped.

3.6.1 Respect and Dignity

First, I explained the purpose of the study, its objectives, and how it would be beneficial to the participants. For example, the IKCs felt honoured and delighted that their native knowledge would be passed on to the next generation. Human rights and dignity were highlighted in this study. Therefore, the IKCs decided to use clan names as a tool to motivate and mobilise other community elders to collaborate with schools and impart traditional knowledge. I was careful to make sure that whatever I wrote in this study did not take away the participants' dignity. I also made sure that their wellbeing and privacy were respected during the research. Before I started the study, I made sure to explain to the participants and IKCs that it was a voluntary process and that they could choose to withdraw or stop participating at any time.

3.6.2 Transparency and Honesty

Before signing the consent forms, I explained the entire research process, including its purpose and nature, and the interests and role of the research participants. Consent letters were written in both English and isiXhosa so that the participants understood the scope of the task before them (IKCs and learners). Permission was obtained from all gatekeepers to conduct this study.

3.6.3 Accountability and Responsibility

This study was carried out in compliance with the ethical principles and guidelines of educational research. In other words, I did not abuse my position as a researcher in any way. As a researcher, it was my responsibility to create an environment that suited the purpose of the research and to ensure that the participants' human rights and dignity were respected. I was also fully responsible for the safe storage of all data collected. All the

research data (video and tapes) were placed on an external hard drive and will be kept for five years. I also kept in touch with my supervisors to ask for their advice throughout the research process.

3.6.4 Integrity, and Academic Professionalism

I conducted unbiased research concerning politics, race, sexuality and culture. Likewise, my research approach was academically comprehensive. I also created a research journal in which I documented relevant research processes. Data collected for my research was kept securely in electronic copies so that they could not be accessed by others. In addition, I also kept participants' transcripts, journal reflections, notes, and video documentation in hard copy and electronic form in a secure location.

3.7 Chapter Summary

This chapter has provided a comprehensive overview of the research methodology employed in the study, "Mediating Learning of Nutrition through Traditional Food Processing and Preservation to Grade 6 Rural School Learners". The methodology was anchored in the interpretivist and indigenous research paradigms, as advocated by Bertram and Christiansen (2020) and Chilisa (2012), which facilitated a deeper understanding of learners' perspectives in a rural school setting. The qualitative case study research design, inspired by the works of Cohen et al. (2018) and Thomas (2013), was instrumental in exploring the integration of traditional food processing and preservation methods in the teaching of nutrition.

A variety of data collection methods were used, including a focus group interview (sharing circle), group activities, participatory and lesson observations, and learners' journal reflections. These methods were carefully selected to create a non-threatening environment conducive to open communication, as suggested by Mayana (2020) and Nuntsu (2020), and to capture the richness and depth of the learners' experiences and interactions, in line with the methodological guidance from Sedlacek & Sedova (2017) and Vygotsky (1978).

The focus group interview allowed for an in-depth exploration of learners' viewpoints on traditional food processes. The group activities facilitated active participation and engagement with the local community's knowledge. The participatory and lesson

observations provided firsthand insights into the learners' interactions and learning processes, and the journal reflections offered personal accounts of the learners' experiences and learnings, contributing to the consolidation of knowledge as highlighted by Macmillan and Schumacher (2014). The chapter also addressed the validation process of the research, including the presentation of findings at the SAARMSTE Conference and the SAARMSTE EC Chapter colloquium, reinforcing the study's credibility as per Creswell's (2014) criteria for qualitative research.

In summary, this chapter has detailed the methodological framework and processes employed in the study, ensuring a robust and credible approach to understanding how traditional methods of food processing and preservation can enhance the learning of nutrition among Grade 6 learners in a rural school context.

CHAPTER FOUR: GROUP PRESENTATIONS AND PRESENTATIONS BY INDIGENOUS KNOWLEDGE CUSTODIANS

4.1 Introduction

The primary goal of this interventionist study was to mediate learning of nutrition through using traditional food processing and preservation with Grade 6 rural school learners. This was intended to promote the accessibility of science and its relevance to the life experiences of learners (Gwekwerere, 2016). In this chapter, I thus present, analyse and discuss the observations made during the learners' group activity and the presentations made by the IKCs. This was intended to answer research questions one and two:

- What knowledge of traditional food preservation and processing do Grade 6 rural school learners know from their homes and community?
- How do the presentations by the IKCs on traditional food processing and preservation and consolidation thereof enable and/or constrain Grade 6 rural school learners from talking about and making sense of the topic of nutrition?

4.2 Summary of Qualitative Data Generated During the Group Activity

The purpose of using group activities was to provide a safe and non-threatening environment for learners. Similarly to Nuntsu's (2020) study conducted in South Africa, to guarantee that data collected from the group activity was pertinent to the study, the participants were provided with three key questions to concentrate on and to direct their discussions in their groups (see Section 3.3.6.1). Moreover, the participants were allowed to engage in group discussions in the classroom and thereafter documented their findings on the newsprints.

Table 4.1: Profile of Grade 6 Natural Science Learners

Biographical information	Categories	Learners' clan names	Total number
Age	11-13	L1M, L2M, L3F, L4M, L5F, L6F, L7M, L8F, L9F, L10F, L11M, L12F, L13M, L14F	14
Gender	Male	L1M, L2M, L4M, L7M, L11M, L12M, L13M	6
	Female	L3F, L5F, L6F, L8F, L9F, L10F, L12 F, L14F	8
Mother tongue	isiXhosa	L1-L14M/F	14

The biographical information in Table 4.1 offers a clear demographic breakdown of the participants involved in the study, which is essential for understanding the context and the potential implications of the findings. The age range of the learners, spanning from 11 to 13 years, is a critical factor as it represents a developmental stage where children are transitioning from late childhood into early adolescence. This period is marked by significant cognitive, emotional and social changes, which can influence how learners perceive and assimilate new information, particularly in the context of integrating IK into their learning. The relatively even distribution of ages within this range ensures that the study's findings are not overly skewed towards a specific age group's understanding or response to the educational intervention.

Gender distribution within the group is another crucial aspect, with a slightly higher representation of females (8) compared to males (6). This gender composition is important as it may influence group dynamics, learning styles and the assimilation of the educational content, especially in the context of traditional food processing and preservation methods, which may have gender-specific roles or connotations in some cultures. The learners' shared mother tongue, isiXhosa, is significant as it implies a common cultural and linguistic background, which is likely to impact their prior knowledge and attitudes towards traditional food practices. The homogeneity in language also suggests that the intervention could be delivered in their native language, potentially making the learning process more relatable and effective. This language phase is key when considering the transmission of IK, which is deeply intertwined with language and cultural expressions. The use of isiXhosa in the learning process

could therefore improve the learners' connection to the content, fostering a deeper understanding and appreciation of their cultural heritage.

Table 4.2: Keys and pseudonyms used in data discussion

Learner 1-14 Male/Female	L1-L14M/F
Group 1-3	Vukuzenzele Group (VG), Ququzela Group (QG), Maziphandele Group (MG)
Reflection 1-14	RL1-RL14

Learners were asked to focus on three key questions to guide their discussions in their groups. Each group was assigned a single question to consider. The three main questions were:

1. What are some traditional practices that you know from your home or community related to food processing?
2. What are some traditional practices that you know from your home or community related to food preservation?
3. What are the modern ways that you know from your home or community used to process or preserve food?

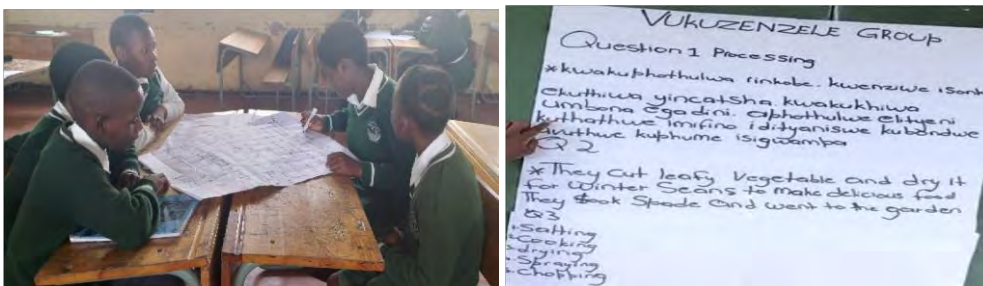
The learners were then provided with the opportunity to document their experiences on newsprints in the classroom and to engage in group discussions. Codes were assigned to them, such as LM1 meaning male learner number one and LF3 meaning female learner number 3. The selection of the group names was based on their conviction that they had gone the extra mile for the information and were actively searching for as much information as possible and their satisfaction in participating in the research process and gaining valuable insights. During the group discussion, the learners were able to talk and make sense of some concepts of nutrition because they could connect the information they brought from their home and community with other concepts that are related to food processing and preservation. This understanding happened before the intervention. After the group discussions, each group presented their findings to the whole class as shown in Figure 4.1 below.



Figures 4.1 & 4.2: MG brainstorming and MG newsprint



Figures 4.3 & 4.4: QG brainstorming and QG presenting



Figures 4.5 & 4.6: VG brainstorming and VG presenting

The presentations were made following the guiding questions and answers, and learners were given a maximum of five minutes to ask questions after the presentations. I planned the activity to take place in the afternoon to avoid disruptions. It took about one and a half hours, and everything was finished within the stipulated time. The discussions were fascinating, and the learners were actively engaged throughout their presentations (Sedlack & Sedova, 2017; Vygotsky, 1978). The presentations of all groups were provided, and the data was used for this analysis. The codes of the groups are shown in Table 4.2 below.

From the learners' presentations, three themes emerged, namely traditional ways of processing food, traditional ways of preserving food and how food is processed and preserved today. To answer research question one. A summary of the presentations of all three groups is provided in Table 4.3.

Table 4.3: Group responses on the group activity

Guiding questions	Groups		
	Vukuzenzele Group Code (VG)	Ququzela Group Code (QG)	Maziphandele Code (MG)
Theme1: Traditional ways of processing food	<ul style="list-style-type: none"> • They make fresh cornbread wrapped in leaves. • They pound the corn. • They eat corn kernels mixed with <i>amasi</i>. 	<ul style="list-style-type: none"> • They sow corn. • They pound fresh corn to make bread. 	<ul style="list-style-type: none"> • They sow corn. • They cook vegetables such as goosefoot (<i>imbilikane</i>) and they add bamboo to make it taste good.
Theme2: Traditional ways of preserving food	<ul style="list-style-type: none"> • They cut leafy vegetables and dry it for winter. • They dig a big hole and smear it with cow dung and put in corn and cover it with a big stone to prevent rain and wind from entering. 	<ul style="list-style-type: none"> • After harvesting the corn they place it in sacks and take it to the hole that is underground and place a big stone. 	<ul style="list-style-type: none"> • Meat was salted and put it on a stick so that it would last for a long time. • Bread was placed on a cool place to prevent it from being spoilt.
Theme3: How food is processed and preserved today	<ul style="list-style-type: none"> • Salting • Cooking • Drying • Spraying • Chopping 	<ul style="list-style-type: none"> • Freezing • Cooking • Peeling • Combining 	<ul style="list-style-type: none"> • Drying • Peeling • Chopping • Salting • Cooking

To gain further insight into this information, I used the five cognitive states from Ogunniyi's (2007a) CAT (see Section 1.6). The results of the group activities, as detailed in the study, provide insightful perspectives into the understanding and application of traditional and modern food processing and preservation methods among Grade 6 rural school learners. The findings are categorised into three distinct themes: traditional ways of processing food, traditional ways of preserving food, and contemporary methods of food processing and preservation.

4.2.1 Theme 1: Traditional ways of processing food

The exploration of traditional food processing methods as highlighted by VG, QV and MG offers a deep dive into the rich tapestry of Indigenous culinary techniques and their inherent connection to local culture, practices and resources (Kibirige & Van Rooyen, 2006). These methods, ranging from corn processing to the use of unique ingredients and techniques, not only provide insight into the culinary heritage of the community but also illustrate the intricate relationship between food, culture and environmental resources.

4.2.1.1 Data from groups

VG methods: The VG's methods of processing food focused primarily on corn, a staple grain in many rural communities where this study was conducted. For instance, the preparation of fresh cornbread wrapped in leaves to protect it from the water when they are making bread is a practice steeped in tradition. This method involves harvesting corn, removing the kernels, and then grinding them into fine flour. The flour is mixed with water and other local ingredients to form a dough, which is then wrapped in corn leaves and steamed or baked. LF5 further explained:

“Isonka sombona babengasingaleli iswekile ngoba umbona une nkCasa ngendalo” (They do not add sugar and yeast because they believe that the fresh corn already has the natural sweetness). The dispute began because LM1 believed that *“eating bread without sugar and yeast meant that the dough was hard and tasteless”*. This seemed consistent with Ogunniyi's (2007a) argument that certain thoughts are suppressed for more compelling reasons. On the other hand, LF3 said that *“andisoze ndisitye isonka esingonyukanga”* (I would not eat bread made from fresh corn there is no yeast added to make it tasty). LF8 expressed a desire to try it based on their mother's recommendation and flavourful

qualities, particularly when *amasi* is added. This method of cooking not only imparts a unique flavour to the bread but also demonstrates an ingenious use of natural resources for culinary purposes.

Pounding corn is another traditional method mentioned by this group. This labour-intensive process involves dehusking the dried corn and then using a mortar and pestle to pound the kernels into a coarse powder or flour. This flour is a versatile ingredient used in various traditional recipes, including porridge and bread. The physical act of pounding is often communal, serving as a social activity and a means of preserving culinary traditions across generations (Mbaiwa, 2011).

Mixing corn kernels with *amasi* that is, a traditional fermented milk product (Nuntsu, 2020), highlights the fusion of different ingredients to create a nutritious dish. *Amasi* is made by allowing raw milk to ferment in a calabash or similar container, resulting in a thick, sour product like yoghurt. During the presentation, LM7 asked: “*Yintoni umehluko Kumasi esiwatyayo kule mihla nalawo ayetyiwa kudala*” (What is the difference between *amasi* that we eat now and *amasi* that was eaten in the past?). LF12 replied: “*Kaloku amasi akudala ayehlala eselweni e-fresh, la siwatyayo ngoku abhaliwe ixesha aphelelwa ngalo*” (Actually, *amasi* that we eat currently has an expiry date, whereas in the past they were always kept fresh in the calabash). The combination of corn kernels with ²*amasi* produces a dish that is not only rich in flavour but also in nutritional value, providing both carbohydrates and probiotics (Ramas et al., 2023).

QG methods: The QG’s also emphasised the importance of corn in their food processing techniques. Sowing corn, a critical step in agricultural practices underlines the connection between farming and food processing. This group’s mention of pounding fresh corn to make bread suggests a shared cultural practice with the VGs, indicating the widespread nature of this technique in the community. The process likely involves similar steps: drying, pounding and then using the corn flour for breadmaking. This bread, a staple food

² *Amasi* is a traditional fermented milk.

in the local diet, is not just a food item but a representation of the agricultural cycle and the community's reliance on corn as a primary food source (Gilbert, 2023).

MG methods: The MG's introduced a distinct element in their food processing methods by incorporating vegetables like goosefoot (*imbilicane*) and flavour enhancers. Goosefoot, known for its nutritional value, is a wild leafy vegetable that is often overlooked in modern diets (Cimi, 2019). The process of cooking goosefoot may involve cleaning, chopping and then boiling or sautéing it with other ingredients. The addition of *intshuku* in the form of shoots introduces an interesting flavour profile and texture to the dish.

4.2.1.2 Culinary techniques and cultural significance

These traditional methods of food processing are not merely techniques for preparing meals; instead, they represent a deeper cultural significance and connection to the land and its resources. Chan et al. (2012) reveal that the transmission of knowledge from one generation to the next through oral means is a critical aspect of the indigenous food system and significantly impacts their function. The use of corn and its various processing methods reflect the agricultural practices and the centrality of this crop in the community's diet and culture shown in the communal aspects of food processing, such as pounding corn or wrapping cornbread.

The integration of other local ingredients, such as *amasi*, goosefoot and bamboo, showcases the diversity of the local ecosystem and the community's knowledge of using these resources. These ingredients are not just sources of nourishment; instead, they are carriers of history, tradition and cultural identity (Kibirige & Van Rooyen, 2006). They represent the community's resilience, adaptability, and deep understanding of their environment.

4.2.1.3 Environmental sustainability and nutritional value

Traditional food processing methods often embody principles of environmental sustainability. The use of natural resources, such as leaves for wrapping bread or natural fermentation techniques for *amasi*, typically require minimal processing, retain more

nutrients and have a lower environmental impact than many modern food processing techniques.

The nutritional value of these traditional foods is significant. For instance, foods like cornbread and *amasi* and dishes made with goosefoot are not only culturally important but also provide essential nutrients. Corn is a good source of carbohydrates and dietary fibre, *amasi* offers beneficial probiotics and calcium, and leafy vegetables like goosefoot are rich in vitamins and minerals (Asif et al., 2023). These traditional dishes, therefore, play a critical role in the dietary health of the community.

4.2.2 Theme 2: Traditional ways of preserving food

The preservation of food using traditional methods is a testament to the ingenuity and resourcefulness of rural communities. The practices described by the VG, QG and MGS highlight a deep understanding of local environmental conditions, seasonal variations and the properties of various food items. These methods, developed and refined over generations, not only ensure food availability during scarcity but also represent a harmonious relationship between people and their natural surroundings.

4.2.2.1 Data from groups

VG – Vegetable and corn preservation

The VG's approach to preserving leafy vegetables for winter shows a practical response to seasonal changes. The process of cutting and drying leafy vegetables is a method of dehydration, which reduces the moisture content in foods, thereby inhibiting the growth of microorganisms that cause spoilage. This technique is particularly important in a context where refrigeration may not be accessible. It allows for the storage of vegetables over extended periods, ensuring a supply of essential nutrients even in the off-season. The choice of leafy vegetables for this process also suggests an awareness of their nutritional value and a desire to maintain a balanced diet throughout the year.

The group's method of preserving corn is particularly noteworthy. Digging a hole, smearing it with cow dung, and covering it with a large stone to protect against elements is an ingenious way to create a natural storage environment. This method likely leverages the insulating properties of the earth and the moisture-regulating effects of cow dung. By

storing corn in such a manner, the community ensures a continuous supply of this staple food, crucial for their sustenance. This practice reflects a deep understanding of the materials at hand and their potential uses in food preservation.

QG – Corn storage techniques

Similarly, the QG's practice of storing harvested corn in sacks in an underground hole aligns with the VG's approach, further validating the effectiveness and widespread use of this technique. Storing corn in sacks in an underground hole might also provide protection from pests and rodents, a common challenge in food storage. This method also suggests an understanding of the importance of a controlled environment in preserving food, where factors like temperature, humidity and light exposure are crucial. This practice, passed down through generations, not only preserves the physical food but also the knowledge and cultural heritage associated with it.

MG – Meat and bread preservation

The MG's method of preserving meat by salting and placing it on a stick represents an ancient yet effective technique. Salting meat is a form of curing, which involves drawing moisture out of the meat to inhibit bacterial growth. Placing the salted meat on a stick likely aids in air circulation, further facilitating the drying process. This method is particularly useful in regions without access to modern preservation technologies like refrigeration or freezing. It allows the community to store meat for extended periods, ensuring protein availability even when fresh meat is not accessible.

The group's practice of keeping bread in cool places to prevent spoilage shows a basic yet effective approach to preserving baked goods. By storing bread in cool, dry places the community can extend its shelf life, reducing waste and ensuring a steady supply of this staple. This method likely relies on finding naturally cooler spots within the household or community structures, showcasing a practical understanding of their living environment.

4.2.2.2 Cultural significance and sustainability

These traditional food preservation methods are deeply rooted in the cultural fabric of the community. They represent a collective wisdom that extends beyond mere survival tactics. These methods are part of a larger cultural narrative that includes understanding the land,

the climate and the available resources. They embody a sustainable approach to living, where nothing is wasted, and everything has a purpose. In a world where food waste is a significant concern, these traditional practices offer lessons in sustainability. They show how communities have historically made the most of their resources, preserving food naturally and effectively without relying on energy-intensive technologies. These methods are eco-friendly, reducing the carbon footprint associated with food preservation.

4.2.2.3 Nutritional and health implications

The nutritional implications of these traditional preservation methods are also significant. By preserving a variety of foods, including vegetables, grains and meats, the community ensures a diverse diet throughout the year. Methods like drying and salting retain most of the nutrients in food, making them a healthier alternative to some modern preservation techniques that might reduce nutritional value. Furthermore, these methods may also have health benefits. For example, fermented products like *amasi* have probiotic properties and dried vegetables retain most of their vitamins and minerals. The diversification of food preservation methods contributes to a balanced diet, crucial for the overall health and wellbeing of the community.

4.2.3 Theme 3: How food is processed and preserved today

In the contemporary context, the methods of food processing and preservation have evolved significantly, reflecting a blend of traditional practices and modern technological advancements. The transition from exclusively traditional techniques to a combination of old and new methods is evident in the approaches mentioned by the VG, QG and MGs. This shift is indicative of the community's adaptation to changing times and access to modern resources, while still retaining elements of their rich culinary heritage.

4.2.3.1 Data from the groups

VG – A blend of techniques

The VG's mention of salting, cooking, drying, spraying and chopping as methods of food preservation represent a fusion of traditional and contemporary practices. Salting and drying are age-old techniques, deeply rooted in historical practices, which have been maintained due to their effectiveness and simplicity. These methods, especially salting,

have been used for centuries to preserve various foods, particularly meat and fish, by drawing out moisture to inhibit bacterial growth.

In contrast, the mention of spraying and chopping is indicative of more modern practices. Spraying could refer to the application of preservatives or treatments that enhance shelf life, a practice that aligns with industrial food processing techniques. Chopping, while a basic culinary technique, is essential in modern food preparation, especially when it comes to packaging and presenting food in a manner that is convenient and accessible.

QG – Embracing modern technology

The methods listed by the QG include freezing, cooking, peeling and combining, reflecting a significant shift towards modern food preservation techniques (equipollent cognitive state). Freezing represents a technological leap in food preservation. It allows for long-term storage without significant loss of flavour or nutritional value, a capability that traditional methods cannot match. Freezing also indicates access to electricity and appliances, suggesting economic development and modernisation within the community. Cooking and peeling, while basic culinary processes, have evolved with modern kitchen equipment, making them more efficient and adaptable to various food items. The act of combining various ingredients to create new food products is a hallmark of modern cooking, reflecting an openness to experimenting with flavours and textures, and an understanding of food chemistry (Spray, 2013).

MG – Modernising traditional practices

The MG's inclusion of drying, peeling, chopping, cooking and salting as contemporary methods show an interesting blend of traditional and modern practices. Drying, a method with historical roots, remains relevant due to its simplicity and effectiveness, particularly in preserving fruits, vegetables and meats. Peeling and chopping are preparatory steps that have been enhanced by modern kitchen tools, increasing their efficiency and changing the way food is presented and consumed. Cooking, an essential process in both traditional and modern cuisines, has been transformed by modern appliances and techniques, allowing for a broader range of culinary possibilities. The continued use of salting indicates its enduring relevance as a preservation method, perhaps adapted now with refined salts and more controlled techniques.

4.2.3.2 Cultural Significance and Sustainability

These traditional food preservation methods are deeply rooted in the cultural fabric of the community. They represent a collective wisdom that extends beyond mere survival tactics. These methods are part of a larger cultural narrative that includes understanding the land, the climate, and the available resources. They embody a sustainable approach to living, where nothing is wasted, and everything has a purpose.

In a world where food waste is a significant concern, these traditional practices offer lessons in sustainability. They show how communities have historically made the most of their resources, preserving food naturally and effectively without relying on energy-intensive technologies. These methods are eco-friendly, reducing the carbon footprint associated with food preservation.

4.2.3.3 Nutritional implications and health considerations

Modern food processing and preservation techniques have both positive and negative implications for nutrition and health. Freezing, for example, preserves most of the nutritional value of food, making it a healthy option for long-term storage. However, some modern methods, especially those involving chemicals or high levels of processing, can reduce the nutritional quality of food and introduce unhealthy elements. There is a growing awareness within communities about these health implications, leading to a more selective adoption of modern techniques. The balance between traditional and contemporary methods is often guided by considerations of health, nutrition and the desire to maintain a connection with cultural food practices.

These results collectively describe an interesting picture of how traditional knowledge and modern practices can coexist (Seehawer & Breidlid, 2021) and influence the learners' understanding of food processing and preservation. The learners' ability to articulate both traditional and modern methods suggests a rich cultural heritage that is adapting to modernity. This adaptation might be influenced by factors such as the availability of resources, exposure to new technologies and changing dietary preferences. The study's findings offer valuable insights into the intersection of traditional knowledge and modern practices, highlighting the importance of preserving indigenous methods while embracing new technologies for sustainable food practices. This resonates with Du Toit (2005), who

emphasises the environmental sustainability of African IK systems, highlighting their role in preserving cultural heritage and nutritional value. This balance is crucial in educating young learners about the significance of their cultural heritage and the need to adapt to a rapidly changing world.

4.2.4 Summary

The results from the study present a complex and convincing expose of the connection and relationship between traditional knowledge and modern practices in the realm of food processing and preservation. This duality not only enriches the learners' understanding of these subjects but also acts as a bridge connecting their rich cultural heritage to the ever-evolving landscape of modernity. The ability of the learners to clearly understand both traditional and modern methods tells of a deep-rooted cultural heritage that is not fixed but is dynamically developing, integrating new elements while recalling its core values and practices.

This adaptation and growth of traditional methods in the face of modernity can be recognised by several factors. Firstly, the availability of resources plays a significant role. As communities gain access to modern tools and technologies, their traditional practices naturally evolve to incorporate these new resources. This progress is not just a matter of accessibility but also a response to the changing environmental and economic landscapes in which these communities exist. Secondly, exposure to new skills significantly impacts how traditional methods are adapted. The introduction of appliances like refrigerators and electric stoves and tools like food processors has revolutionized food processing and preservation techniques. These skills offer competencies and experiences that were previously unreachable, thus manipulating how traditional practices are carried out.

Changing dietary preferences also plays a crucial role in this adaptation process. Globalisation and increased connectivity have exposed communities to an excess of cooking practices and food choices, leading to a shift in dietary habits. This shift often necessitates a re-evaluation and adaptation of traditional food processing and preservation methods to accommodate new types of foods and recipes. For instance, the introduction of freezing as a preservation method caters to the need for storing a wider variety of foods, including those that are not part of the traditional diet.

The study's findings underscore the importance of preserving indigenous methods of food processing and preservation. These methods are not only a source of cultural and historical knowledge but also embody sustainable practices honed over generations (Battiste, 2002). They reflect a deep understanding of the local environment and resources and are often characterised by their low environmental impact. At the same time, the findings highlight the necessity of embracing new technologies and methods to ensure the sustainability of these practices. Modern technologies offer solutions to some of the challenges faced by traditional methods, such as improving the shelf life of food products, enhancing food safety and reducing labour-intensive processes.

Importantly, maintaining a balance between traditional knowledge and modern practices is essential in the education of young learners. It is important that they appreciate and understand their cultural heritage, which includes, for example, traditional food processing and preservation methods in the context of this study. At the same time, they need to be equipped with the knowledge and skills to navigate and adapt to a rapidly changing world. This education should not only focus on the technical aspects of these methods but also on the values they embody, such as sustainability, community and a deep connection to the natural world.

4.3 Presentation by the Two Indigenous Knowledge Custodians


In this section, I provide a concise overview of the presentations delivered by two IKCs (Table 4.4). We met with the IKCs and did a practical demonstration on IK for the Grade 6 class about traditional food processing and presentations based on their culture and customs. The information from their presentations was used to co-develop a lesson plan that integrated IK. The purpose of this data collection technique was to answer the following question:


How do the presentations by the IKCs on traditional food processing and preservation and consolidation thereof enable and/or constrain Grade 6 rural school learners from talking about and making sense of the topic of nutrition?

The presentations by the IKCs were attended by all 14 learners from Grade 6 Natural Science class. I also invited a critical friend who video-recorded and participated in the discussions during the lesson presentations. The purpose of the presentations was to provide the IKCs with an opportunity to share their heritage, wisdom, and knowledge on traditional ways of processing and preservation of food with a focus on meat, sour milk (*amasi*), grain and leafy

vegetables (*isigwampa* such as *imithwane*, *iguzu*, *imbikicane* and *intshuku*). Furthermore, this also provided learners with a chance to pose questions. The IK from IKCs was then used to mediate learning on the topic of nutrition. The IKCs chose to use their clan names in this study, so codes and pseudonyms did not apply.

Table 4.4: Raw data from indigenous knowledge custodians

Indigenous Knowledge Custodian	Raw data
 <p data-bbox="193 1491 850 1559">Presenter 1 (Mathawuzela) presenting to the Grade 6 class on day one on how food was processed.</p>	<ul style="list-style-type: none"> <li data-bbox="900 376 1402 443">• In the past, we relied only on staple food like grain, <i>amasi</i>, <i>imifuno</i> and meat. <li data-bbox="900 465 1402 499">• Grain was processed to produce mealie. <li data-bbox="900 521 1402 589">• We would choose small pieces of grain and knead it and cook it as porridge. <li data-bbox="900 611 1402 678">• When meat was slaughtered it was hanged because we did not refrigerators. <li data-bbox="900 701 1402 801">• Sometimes it was pulled and placed on top of the roof and surrounded by smoke to avoid being quickly affected. <li data-bbox="900 824 1402 891">• We cooked corn cobs and then ate cheese curds (<i>amasi</i>). <li data-bbox="900 913 1402 981">• The children ate a porridge of split corn called <i>inembe</i>. <li data-bbox="900 1003 1402 1126">• Sugar and salt were scarce, when we wanted porridge we used to take corn starch and pound it so that the taste came out and we got sugar. <li data-bbox="900 1149 1402 1272">• We used sorghum to make <i>amarhewu</i> and we loved them because they were healthy, we rarely got sick and we were strong. <li data-bbox="900 1294 1402 1361">• Our main food in the past was corn, the only thing we used to eat was cornbread. <li data-bbox="900 1384 1402 1485">• During the autumn we ate chowder and vegetables (<i>imithwane</i>, <i>imbilicane nentshuku</i>).

	<ul style="list-style-type: none"> • In the past we depended on planting corn seed. • We used underground bunkers and stored the meat for a long time. • When we harvested maize, we buried it underground before it was planted, and we smeared it with cow dung. • We covered it with a big stone and then it was smeared with cow dung so that air and rain did not enter. • Hard corn was used to make alcohol. The pumpkin was sliced into small pieces and placed in the sun to dry. Some corn was made into cobs and hung on top of the house and blown up by smoke.
<p>Presenter 2 (Mbotho) presenting to the Grade 6 class on day 2.</p>	

They were both born and raised in Port St Johns. Two IKCs presented their experiences of traditional ways of processing and preserving food to Grade 6 learners. The background of the two Aboriginal IKCs revealed that they had both similarities and differences. Both spoke isiMpondo and isiXhosa as their home languages. Mbotho (clan name) was a retired miner and now worked hard as a farmer and a preacher of the word of God. He went to school at the age of 14 years, and he passed standard 4. Mathawuzela was also a pensioner always working in her small garden. She did not attend school because, in the past, her parents believed that females must get married, and her parents followed that tradition.

4.3.1 Presenter 1: Mathawuzela’s insights on traditional food processing

Traditional food processing methods, such as drying, smoking and salting, preserve cultural heritage and enhance food flavour, nutrition, and shelf life. These techniques utilise local resources and indigenous knowledge, supporting food security and sustainability. This subsection explores the significance, methods, and benefits of traditional food processing,

emphasising its role in maintaining cultural identity and community well-being as discussed below:

4.3.1.1 Traditional diet and grain processing

Mathawuzela's presentation provided an enlightening perspective on the traditional food processing methods and dietary practices of a rural community. Her discussion centred on the reliance on staple foods such as grain, *amasi*, *imifuno* and meat, reflecting the community's deep connection with their local environment and resources. The grain processing to produce mealies, a form of maize meal, is particularly noteworthy. This process involves the manual grinding of maize into a fine powder, which is then used to prepare various dishes, most notably porridge. This method of grain processing not only demonstrates a sustainable approach to food consumption but also represents the ingenious use of available resources. The versatility of maize, a crop that can be grown in a variety of soils and climates, makes it an ideal staple in their diet.

4.3.1.2 Meat preservation techniques

In the absence of modern refrigeration technology, the community relied on innovative and natural methods for preserving meat. Mathawuzela highlighted the technique of air-drying meat by hanging it, which allows for slow dehydration and prolonged shelf life. LF5 asked: "*Makhulu yeyiphi enye indawo enani ngcina kuyo inyama ukuze ihlale ixesha elide?*" (Grandmother which other places did you put meat to stay long?). Mathawuzela said we used the natural environment's airflow to preserve the meat "*enye siyibeke emdekweni okanye siyifake kwisabhunge*" (The other one we put it underground where is it cool). In addition, the practice of smoking meat by placing it on rooftops is a testament to the ingenuity of traditional preservation methods. Smoking not only helps to preserve the meat for longer periods but also imparts a distinct flavour, making it a favoured technique. The use of smoke for preservation is significant as it contains natural preservatives and antimicrobial agents that inhibit the growth of bacteria, thus extending the meat's edibility and safety.

4.3.1.3 Corn as a central dietary element

The centrality of corn in the community's diet was a recurrent theme in Mathawuzela's presentation. She detailed various traditional methods of preparing corn, such as boiling corn

cobs, mixing amasi with corn and making a special type of porridge from split corn called ³*inembe*.

LM1 asked: “yintoni yona inembe” (What is inembe?) Mathawuzela explained: “Yayisisidudu esa sisondla ngaso abantwana ngoba zazingekho inestum thina sasi sondla ngemenbe siphinde siba ncancise ibele” (Inembe refers to the porridge traditionally given to infants, which is pounded and then fried). These practices highlight the versatility of corn and its significance in their daily diet. Furthermore, the scarcity of sugar and salt led to innovative uses of corn, like pounding corn starch to release its natural sweetness, showcasing the community’s resourcefulness and understanding of the intrinsic properties of corn. This creativity in using corn not only catered to their dietary needs but also represents a deeper cultural and historical significance.

4.3.1.4 Health benefits and seasonal foods

Mathawuzela also emphasised the health benefits associated with traditional diets, specifically mentioning the use of sorghum in making *amarhewu*. This traditional beverage, made by fermenting sorghum, is noted for its health benefits, including aiding digestion and providing essential nutrients. The focus on sorghum, a drought-resistant grain, also illustrates the community’s adaptation to their environment and the use of crops best suited to their climatic conditions.

The consumption of seasonal foods, such as chowder and seasonal vegetables like *imithwane*, *imbilikicane* and *nentshuku* during autumn, further reflects the community’s harmonious existence with natural cycles. This practice of eating seasonally not only ensures a varied diet rich in nutrients but also minimizes waste and maximizes the efficiency of available resources. Such dietary habits rooted in the cycles of nature are not only sustainable but also ensure that the community consumes fresh and nutritionally rich foods.

³ *Inembe* is a traditional porridge made with corn.

4.3.1.5 Culinary techniques and cultural significance

The traditional culinary techniques discussed by Mathawuzela are significant not just for their practicality but also for their cultural implications. These methods reflect the community's history and traditions, passed down through generations. The preparation of food in these traditional ways is deeply intertwined with cultural rituals, social gatherings and the everyday life of the community. These practices are not merely about sustenance but are integral to the community's identity and heritage.

4.3.2 Presenter 2: Preserving and using food resources

Effective preservation and utilisation of food resources are vital for food security, and sustainability. Methods like freezing, drying and fermentation extend shelf life and maintain nutritional value. Efficient use of food, including leftovers and by-products, supports a sustainable food system. This subsection explores the importance, methods and benefits of these practices in ensuring long – term food availability and environmental stewardship.

4.3.2.1 Dependence on corn and meat preservation

Mbotho's emphasis was on the community's reliance on corn and innovative meat preservation techniques provided an insightful look into traditional food storage practices. The use of underground bunkers for storing meat is a prime example of how pre-modern societies adapted to their environment to meet their food preservation needs. This method, effectively creating a natural refrigerator, demonstrates a sophisticated understanding of environmental conditions conducive to prolonging the shelf life of perishable goods like meat. By storing meat underground, the community could naturally slow down the decomposition process, thus ensuring a continuous supply of protein, crucial for their diet and survival.

4.3.2.2 Innovative storage solutions

The method of storing maize underground, sealed with cow dung, exemplifies an advanced understanding of creating airtight and moisture-resistant conditions. This practice highlights not only the creative use of available materials but also an acute awareness of the factors leading to food spoilage. Cow dung, a readily available resource, serves as an effective sealant, keeping out moisture and pests, thus preserving the quality and edibility of the maize. The use

of a large stone as a lid further protects the stored food from external elements like rain and animals, ensuring its safety and longevity.

4.3.2.3 Use of corn for alcohol and food preservation

Mbotho's discussion on the multifaceted use of corn, particularly in the production of alcohol, sheds light on the cultural and social significance of this crop. The conversion of corn into alcohol suggests its role in social rituals, possibly functioning as a communal beverage during gatherings and celebrations. This practice not only reflects the resourcefulness of the community in using their staple crop but also highlights the social and cultural dimensions of food and drink. The mention of drying sliced pumpkin in the sun as a method of preservation demonstrates a comprehensive understanding of dehydration techniques. This method, effective in preserving the nutritional value of the pumpkin, also points to the community's ability to adapt their preservation methods based on the type of food.

4.3.2.4 Integration of traditional knowledge in a modern context

Mbotho, much like Mathawuzela, effectively communicated the depth and richness of traditional knowledge in food processing and preservation. These insights provide a window into a time when communities lived in close harmony with their natural environment, making the most of every resource with efficiency and respect. The methods presented which encompass grain processing, and meat and vegetable preservation, demonstrate a sustainable approach to food consumption that modern societies can still learn from.

4.3.2.5 Sustainability and Environmental Harmony

The traditional practices shared by Mbotho are not merely survival strategies but are a testament to human ingenuity and adaptability. These methods showcase a profound understanding of the natural properties of food and the environment. The community's reliance on natural cycles, their use of locally available resources and their minimal waste approach are principles that resonate with contemporary ideas of sustainable living. Such practices underline the importance of living in balance with the environment, using its resources judiciously and minimizing the ecological footprint.

4.3.2.6 Health benefits of traditional methods

The health benefits of these traditional food preservation methods are significant. Natural processes like smoking and drying not only retain the nutritional value of the food but can also introduce beneficial properties. Smoking is a drying technique that adds flavour to food and keeps bacteria (carrying insects) out of the drying process. For instance, smoking meat can add antioxidants, while the fermentation process in creating drinks like *amarhewu* introduces probiotics. These methods align well with modern nutritional guidelines that emphasise the importance of a diverse diet rich in essential nutrients.

4.3.2.7 Adapting traditional knowledge to modern needs

In a modern context, these traditional methods offer valuable lessons in sustainable and healthy food practices. While technological advancements have introduced new ways of food preservation, the principles underlying these traditional methods remain relevant. They encourage a return to natural, simpler ways of food processing, which can be both environmentally sustainable and beneficial for health. By integrating these traditional methods with modern technologies, there is potential to develop innovative, sustainable food preservation techniques that respect both cultural heritage and contemporary health standards.



Figure 4.7: Practical demonstrations of how food is processed by the IKCs (Mathawuzela)



Figure 4.8: Practical demonstration of how food is preserved by IKC (Mbotho)

4.4 Chapter Summary

The findings of this study which were based on the group activities of learners and presentations by the IKCs revealed a diverse range of traditional and modern approaches to food processing and preservation. These insights not only provide a hint into cultural heritage and sustainable practices of a rural community but also demonstrate how traditional knowledge is changing and adapting to modern times.

The learners' exploration of traditional food processing methods, such as natural preservation methods and the preparation of staple foods, highlighted their strong cultural connection. These practices demonstrated sustainability, efficiency and a minimal waste approach, reflecting a deep understanding of the natural environment. In addition, the learners' recognition and adoption of modern methods like freezing, drying and kitchen technology showed their ability to adapt to contemporary lifestyles while integrating new knowledge into traditional practices.

Secondly, the presentations by the IKCs, Mathawuzela and Mbotho, highlighted the historical and cultural significance of traditional food processing methods. Their insights provided valuable context to the learners' understanding of their community's practices, emphasising the importance of preserving these methods not only as a means of sustenance but as a vital part of their cultural identity. The custodians' descriptions of using

underground bunkers for meat preservation, the multifaceted use of corn, and seasonal dietary habits illustrate a lifestyle in harmony with nature and the cycles of the environment.

The integration of these traditional methods with modern practices in the curriculum is crucial for educating young learners about the significance of their cultural heritage in a rapidly evolving world. This approach fosters a sense of identity and belonging while equipping them with the knowledge and skills to navigate contemporary challenges in food sustainability and nutrition. The findings from this chapter suggest that a balanced approach, incorporating both traditional wisdom and modern techniques, is essential for a comprehensive understanding of food processing and preservation. This balance is particularly relevant in today's global context, where sustainability and health are major concerns in food production and consumption.

Chapter Four successfully demonstrated the richness of traditional knowledge in food processing and preservation and its evolving relationship with modern practices. The learners' and IKCs' contributions underscore the importance of preserving this knowledge as a vital component of cultural heritage and as a key to sustainable and health-conscious living. As we move forward, it is crucial to continue valuing and integrating this wisdom into modern practices and educational curricula, ensuring its transmission to future generations.

CHAPTER FIVE: LESSON OBSERVATIONS, FOCUS GROUP INTERVIEWS AND LEARNERS' JOURNAL REFLECTIONS

5.1 Introduction

In the previous chapter, I introduced, analysed and presented observations from the learners' group activity and presentations made by the IKCs to answer my research three. All the lessons were recorded with the learners' consent to ensure ethical principles were respected. This chapter presents the analysis and findings derived from the data collected through the lesson observation, the focus group interviews and the learners' journal reflections. This information was used to provide answers to the following question:

How does an exemplar lesson that integrates traditional ways of processing and preserving food enable and/or constrain Grade 6 rural school learners from talking about and making sense of the topic of nutrition?

5.2 Data Generated from Lesson Observations

The lesson will be taught by integrating IK into the science class. The goal of the lesson was to familiarise learners with the basic terms related to food processing and preservation to mediate learning of the topic of nutrition, such as drying, smoking, grilling, grinding, salting, peeling, picking and cooking. Ten learners' journal reflections were received as shown in Table 5.1 which were coded.

Table 5.1: Data generated from lesson observation

Data-gathering tool	Codes used in data discussion
Lesson on practical activities	L1PA- L2PA
Lesson that integrated indigenous knowledge	LIİK
Learners' journal reflection	L1J, L2J, L3J, L9J, L10J
Focus group interviews	FGI

Focus group codes (clan names)	Jola, Mamzangwa, Nyawuza, Zulu
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5.2.1 Data generated from lessons on food processing and preservation

The topic is about food processing and preservation. It involves the preparation and conservation of food to ensure its edibility and prolonged shelf life. I assigned my learners with the first activity which included images of various foods sourced from both plants and meat from the Spot on Natural Sciences and Technology Grade 6 Learners' book. The task required learners to associate food images with corresponding descriptions, distinguishing between those derived from plants and those from meat. The learners interacted with each other as they discussed in their groups and formulated some responses. Their responses were as follows: cabbage, onion and tomato are planted in picture 1; polony, and sausage are made from meat in picture 2; raw materials are mentioned in picture 1; processed and ready for consumption in picture 2.



Figure 5.1: Activity from Grade 6 NST Learners' Book (Platinum NST Learner's Book).

The second activity was a hands-on activity whereby learners had to make dried fruit. I instructed learners to bring available fruit and some brought apples, mangoes and pears. As they cut the fruit into small pieces and placed it in the lemon juice, I asked why they put the pieces into the lemon juice. L12 mentioned that they were preventing the fruit from turning brown. L4 said “*Bendingayazi undincedile*” (I did not know, thank you).

I further explained that drying removes water content. Also, dried fruit are rich source of dietary fibre, aiding digestion retain essential vitamins (like vitamin A and vitamin C). Dried fruits contain antioxidants which help to protect cells from damage caused by free radicals. L2 asked if the dried fruit had sugar added to it. L14 responded by saying dried fruit contains natural sugars like fructose, providing us with a quick energy boost.

5.2.2 Themes that emerged from lesson observation

This section analyses evidence from the lesson on food processing and preservation, which included an intervention that incorporated IK into the curriculum for teaching nutrition concepts. A video recording of the lesson was made with consent from the participants. The main objective of the lesson was to introduce learners to basic terms associated with food processing and preservation to improve their understanding of nutrition concepts. The main instructional concepts encompassed representation, hands-on activities and discussions after viewing a video on food processing and preservation fundamentals. The CAPS document (DBE, 2011) recommends that teachers should incorporate presentations, practical activities and discussions, aligning with the specific aim of enabling learners to comprehend scientific, technological and environmental knowledge and apply it in new contexts.

Table 5.2: Emerged themes from lesson observation on food processing and preservation

Theme	Code	Description
Integration of Indigenous Knowledge and Modern Science	IK	The lesson aims to connect learners’ previous knowledge with new concepts in the context of food processing and preservation.

Experiential Learning through Hands-on Activities	EL	The instructional approach incorporates hands-on activities, such as the practical demonstration of making dried fruit, to engage learners in active participation.
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5.2.3 Data generated from a lesson that integrated Indigenous knowledge

To promote meaningful learning, teachers should create lessons that are designed to facilitate the acquisition of knowledge, skills and values. Also, teachers should use their creativity and originality when deciding how to teach and interpret the resources. This ensures that teaching methods are engaging and effective in meeting the desired learning outcomes.

After the IKCs delivered their presentations, I developed a lesson plan that integrated IK into my teaching of the topic of nutrition. I subsequently taught the topic of nutrition and my lesson was videotaped and observed by my critical friend. Kibirige and Van Rooyen (2006) suggest that teachers should cultivate their abilities to smoothly integrate IK into their teaching practices allowing for the effective communication and practical application of IK. I started my lesson by presenting the learners with an activity that involved six food products in Figure 5.1 (raw materials).



Figure 5.2: Activity 2 from Grade 6 NST Learners' Books

Learners showed an encouraging response as they successfully paired raw materials with food products. They responded by saying wheat is transformed into bread, sugar cane into sugar and fish into tuna. In the subsequent task, I prompted them to provide explanations for the food processing procedures.



Figure 5.3: Activity 3: Learners identify different ways of processing and preserving food

I asked the learners to clarify the connection between processing food as explained by Mathawuzela and the principles discussed. Learners were engaged in discussions, deliberating on my question: “*Why do we process and preserve food*”. I drew parallels with WS, where observation contributes to community-based learning. Contrarily, L4 contested the relevance of certain statements from Mathawuzela and Mbotho in science, citing the example of the smoke from the fire protecting maize seeds.

I elaborated on the importance of questioning statements rather than blindly accepting them, urging the learners to scientifically verify information. Integrating IK into science lessons underscores the significance of cultural beliefs, practices and prior knowledge contributing to an enriched learning experience for the learners. Below I discuss the themes that emerged.

5.2.3.1 Theme 1: Integration of indigenous knowledge and modern science

The thematic analysis revealed the instructional emphasis on linking learners’ existing knowledge with new concepts, particularly in the context of food processing and preservation. The lesson was delivered to the learners, which emphasised the integration of IK and science to establish a seamless transition from familiar knowledge to novel understandings. It focused on exploring the various aspects of food processing, including traditional and modern methods as well as the significance of processing in making raw food more edible, long-lasting and nutritious. Moreover, the module delved into the historical and contemporary practices of food processing, emphasising the role of human activity in enhancing the safety, nutritional value

and palatability of food. Through this educational resource, I aimed to provide insights into the science behind food processing, thereby enriching the learners' understanding of food processing and preservation.

Essentially, integrating IK into modern science education on food processing and preservation aligns with the educational recommendation to facilitate the integration of previous and emerging knowledge in new lessons. This integration provides a more holistic and culturally responsive approach to learning, while also promoting the preservation and recognition of traditional practices. This aligns with previous studies that emphasised the value of integrating IK with formal education to create a more inclusive and holistic learning environment. For instance, Erinoshó's (2013) study reported that the integration of indigenous scientific knowledge into formal school science instruction enhanced the learning of scientific concepts among learners in Nigeria.

Similarly, the study by Sumarni et al. (2022) also demonstrated that integrating scientific principles into the preparation of traditional medicines holds significant implications for indigenising the science curriculum in Indonesia, particularly through an ethno-STEM-oriented teaching/learning approach. Another study conducted by Nikodemus (2017) in Namibia indicated that the inclusion of IK and practices, such as the traditional Namibian practice of making *oshikundu*, into the teaching of Physical Sciences enhanced learners' engagement, participation and understanding of the concept of rates of reactions.

5.2.3.2 Theme 2: Experiential learning through hands-on activities

The instructional approach incorporated hands-on activities to engage learners in active participation. The hands-on activities aimed to provide experiential learning opportunities, enabling learners to directly engage with food processing methods and understand the practical aspects of preservation.

The use of hands-on activities during lessons has been shown to facilitate direct engagement with practical aspects, providing experiential learning opportunities within the instructional setting. It also underscores the importance of structuring the course in a manner that facilitates learners' active participation in practical activities, enabling them to grasp the underlying concepts and real-world implications of food processing and preservation. This approach aligns with previous studies emphasising the effectiveness of active learning methods in enhancing

learners' understanding. For instance, Vygotsky (1978) also reported that learners acquire knowledge through direct experiences and active participation. Also, the study by Dueñas et al. (2022) aimed to teach the osmosis phenomenon through hands-on activities, and the findings reported the positive impact of experiential learning on learners' perception and understanding of scientific concepts. Similarly, Soma et al. (2021) discussed the role of intergenerational storytelling and informal learning in documenting traditional food preservation techniques.

5.3 Themes That Emerged from Focus Group Interviews (Sharing Circles)

It was important to better understand the learners' perspectives and experiences about traditional food processing and preservation. The main objective for doing this was to gather qualitative data on the learners' perceptions, attitudes and experiences regarding the lesson on nutrition, traditional food processing and preservation. The findings from the focus group interviews (sharing circles) revealed four key themes and these are presented in Table 5.3 below.

Table 5.3: Themes that emerged from focus group interviews (sharing circles)

Theme	Code	Description
Integration of Indigenous Knowledge and Modern Science	IK	Linking traditional food processing and preservation with scientific concepts.
Experiential Learning through Hands-on Activities	EL	Engaging in practical, hands-on experiences to understand food processing and preservation.
Community-Embedded Learning Experiences	CL	Emphasising the importance of integrating community knowledge and experiences into the educational process through presentations and discussions to promote a comprehensive and culturally enriched learning environment.
Visual Learning Aids for Enhanced Engagement	VL	Using relevant pictures and visual aids to enhance student engagement in scientific topics, fostering a deeper understanding of the subject matter through visual representation and experiential learning.

5.3.1 Theme 1: Integration of Indigenous Knowledge and modern science

The first theme that emerged from the thematic analysis of the focus group interview (sharing circles) transcripts was the “Integration of Indigenous Knowledge and Modern Science”. This theme underscores the importance of blending traditional knowledge with modern scientific concepts in the context of education. For instance, when asked to share their thoughts on how the topic of “food preservation and processing” can be taught and learned, Mamzangwa noted: “*The topic can be taught by using old science and modern science together*”. This learner’s response highlights the value of integrating traditional methods with contemporary scientific approaches to enrich the learning experience.

In addition, Zulu emphasised the relevance of both modern and traditional practices in science education by explaining: “*At school, we were taught how to preserve food using modern ways, and at home, we are taught that if we do not have a fridge, we can put the meat on the trees to avoid being rotten*”. This learner’s response also highlights the significance of acknowledging and integrating diverse methods of food preservation within the educational framework. Furthermore, Jola expressed the interconnectedness of local practices and science education by stating: “*It is related by using both of their knowledge*” when asked about the relationship between local practices and science at school. This response underscores the importance of recognising and integrating local knowledge within the science curriculum to promote a comprehensive understanding of scientific principles and traditional practices.

The various responses from learners point to the significance of linking traditional food processing and preservation with scientific concepts. This indicates the recognition of the value of integrating IK and traditional practices with modern scientific principles in educational settings. By acknowledging the relevance of traditional methods alongside contemporary scientific approaches, learners are emphasising the importance of a holistic and inclusive approach to science education that incorporates diverse cultural perspectives and experiences.

This has an affinity with Demssie et al.’s (2020) findings which emphasised the importance of combining IK and modern education to foster sustainability competencies, indicating the potential for integrating traditional practices with contemporary educational approaches.

5.3.2 Theme 2: Experiential learning through practical application

Another theme that emerged from the learners' responses was the emphasis on experiential learning through practical application. Learners highlighted the importance of engaging in practical, hands-on experiences to understand food processing and preservation in a meaningful way. For instance, Nyawuza mentioned "*At home, we put the meat on the fire (smoking). We also put the meat in the fridge*", indicating the practical application of food preservation techniques in a real-life context.

Similarly, Zulu emphasised: "*The processing of meals is used in our home every day; for instance, we do the pounding of corn, also we dry the pumpkin for later use*", underscoring the regular use of traditional food processing methods within their daily lives as reiterated by Gwekwerere (2016).

These statements highlight the learners' recognition of the value of experiential learning and practical application in understanding food processing and preservation. By drawing from their own experiences and practices, these learners emphasised the significance of hands-on engagement with traditional methods, which aligns with the principles of experiential learning. This approach allows learners to directly interact with and apply the concepts they are learning, fostering a deeper understanding of the subject matter. This aligns with previous literature emphasising the effectiveness of active learning methods (Dueñas et al., 2022; Green et al., 2006; Martindale, 2016; Martindale & Schiebel, 2017; Soma et al., 2021).

5.3.3 Theme 3: Community-embedded learning experiences

The third theme that emerged from the thematic analysis of the responses was "Community-embedded learning experiences". Learners emphasised the importance of integrating community knowledge and experiences into the educational process through presentations and discussions to enrich the learning experience and promote a comprehensive and culturally enriched learning environment.

For instance, when asked to share additional information regarding integrating local knowledge and science lessons, the following responses were recorded. Jola noted: "*We must invite the community members to come to do the presentation*". Nyawuza added: "*We*

need to have the community invited to do the presentation because we have seen that our indigenous knowledge custodians have the knowledge of science that we learn at school". To complement them, Zulu said: *"We need to invite the community members to do the presentation, especially for the lessons that are relevant to indigenous knowledge"*.

The above responses from learners underscore the significance of involving the community in the learners' educational journey, providing diverse perspectives and enriching the learning experience through the integration of local knowledge and practices. By recognising the value of community-embedded learning experiences, the learners highlighted the importance of creating an inclusive and culturally relevant educational environment that goes beyond the traditional classroom setting. This approach aligns with the principles of community-based participatory research, which emphasises the active involvement of community members in the educational process to enhance learners' understanding and appreciation of diverse cultural perspectives (Hinckson, 2017; Jacquez et al., 2012; O'Fallon & Dearry, 2002; Valaitis et al., 2022).

5.3.4 Theme 4: Visual learning aids for enhanced engagement

The thematic analysis also revealed that "Visual learning aids for enhanced engagement" was another key theme that emerged from the responses. Learners suggested that relevant pictures and visual aids should be used to enhance student engagement in scientific topics, thereby fostering a deeper understanding of the subject matter through visual representation and experiential learning.

For instance, Zulu mentioned: *"We need relevant pictures of nutritious food that illustrate how processed and preserved food is beneficial for our health"*. Jola also noted: *"We must have pictures when we are taught science"*. Also, Nyawuza added: *"Pictures that are relevant to the topic should be used to enhance our learning process"*.

These responses from learners highlight the recognition of the value of visual learning aids as an effective tool for promoting student engagement and comprehension of scientific subjects. By emphasising the importance of incorporating visual aids such as pictures, the learners underscore the potential benefits of enhancing the learning experience through visual representation, which aligns with the principles of experiential and visual-based learning. This theme underscores the significance of using visual learning aids to facilitate

active learning and promote deeper conceptual understanding among students within the realm of science education.

Empirical evidence has shown that visual representations support and enhance learners' engagement, conceptual gains, and reasoning processes in science classrooms. For instance, Yellepeddi and Roberson (2016) conducted a study to evaluate the impact of integrating animated videos of oral solid dosage form manufacturing into a pharmaceutical course. The findings indicated that the implementation of animated videos resulted in enhanced student learning and favourable perceptions of the instructional approach. Curley et al. (2018) and Okan (2003) also found that the integration of visual aids into lessons was found to capture learners' attention and improve learning outcomes.

5.4 Themes That Emerged from Learners' Journal Reflections

To complement the focus group interviews (sharing circles) and lesson observations, I analysed learners' journal reflections. These reflective journals were distributed to all the learners so that they could all get an opportunity to reflect on their experiences (Mayana, 2020). However, I then selected 10 journals with the main goal of gaining insights into the learners' personal thoughts, emotions, experiences and reactions to the traditional food processing and preservation lessons that were taught to them. The analysis of the journal reflections revealed that the learners were intrigued by the practical aspects of traditional food processing and preservation. Two main themes emerged from the analysis of the journal reflections (see Table 5.4 below).

Table 5.4: Themes that emerged from learners' journal reflections

Theme	Code	Description
Knowledge Acquisition	KA	Emphasising learners' understanding of the traditional methods and modern techniques involved in the preservation and processing of food, the benefits and disadvantages of these practices, including the nutritional value, shelf life, potential health implications, etc.
Experiential Learning through Practical Activities	EL	Engaging in practical, hands-on experiences to understand food processing and preservation.

Community-embedded Learning Experiences	CL	Emphasising the importance of integrating community knowledge and experiences into the educational process through presentations and discussions to promote a comprehensive and culturally enriched learning environment.
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5.4.1 Theme 1: Knowledge acquisition

One of the key themes emerging from the reflective journals was ‘Knowledge acquisition’. Learners highlighted their understanding of the traditional methods and modern techniques involved in the preservation and processing of food. They became knowledgeable about the benefits and disadvantages of these practices, including the nutritional value, shelf life and potential health implications associated with different food preservation and processing methods.

For instance, L1J noted: “*I learned that local knowledge is linked with the modern ways of processing and preserving food*”. L2J added the following when asked what he enjoyed about the lesson:

I enjoyed that the food that was eaten by our ancestors (grandparents) was more nutritious than the food that we eat. For the food that we eat today, we use cooking oil, while in the old days, no oil nor aromatics used.

Similarly, L3J also mentioned: “*I enjoyed the fact that traditional food preservation methods are healthy, but modern methods often require additives, which are not healthy*”. L7J also noted the following when asked what they did not enjoy about the lesson: “*What I did not enjoy in this lesson is that the food we eat is not healthy and can make us sick*”.

These statements show that the learners developed a comprehensive understanding of both traditional and modern food preservation and processing methods, including their nutritional aspects, shelf life and potential health implications. The learners’ reflections indicate a deepening of their knowledge base regarding the intricate relationship between traditional food practices and contemporary scientific advancements, emphasising a holistic appreciation of food preservation and processing techniques.

5.4.2 Theme 2: Experiential learning through practical activities

Another major theme, “Experiential learning through practical activities” emerged from the reflexive journals. Learners emphasised the need for more hands-on and experiential learning opportunities. For instance, L2J stated the following when asked how the lesson could be improved,

The lesson should be more practical. We need to be more involved in the lesson by bringing ingredients. If the lesson is about how to do the drying, we must bring it, for instance, apples and practically show us how to preserve apples through drying.

L2J's response underscores the learners' desire for more practical and hands-on learning experiences, emphasising the importance of active involvement in the learning process. This aligns with the concept of experiential learning, which suggests that learners acquire and retain knowledge more effectively when they are actively engaged in practical activities. According to Kolb's experiential learning theory, individuals learn through concrete experiences, reflective observation, abstract conceptualisation and active experimentation (Morris, 2020). This suggests that incorporating practical activities, such as the hands-on demonstration of food preservation techniques using actual ingredients, can enhance the learning experience and deepen understanding. In addition, L4J and L6J mentioned: "*We need to do more practical activities and be more involved in the lessons*".

The overall findings revealed that learners expressed a strong preference for practical, hands-on activities that allow them to engage directly with the subject matter. This theme underscores the significance of experiential learning, as learners seek opportunities to actively participate in practical activities that deepen their understanding of the lesson content. By highlighting the importance of practical involvement and experiential learning, the learners emphasised the value of actively engaging with the learning material, thereby enriching their educational experience and fostering a deeper understanding of the subject matter.

5.4.3 Theme 3: Community-embedded learning experiences

The journal reflections analysis also revealed another key theme, “Community-embedded learning experiences”. Learners consistently emphasised the importance of engaging with

local IK and involving community members in the learning process to ensure the authenticity and cultural relevance of traditional food practices.

For instance, L9J said the following when asked how the lesson should be improved: *“The lesson can be improved by inviting local indigenous knowledge to come and do the presentation, especially on the relevant topic that can give us more knowledge”*. Similar sentiments were shared by L5J, who noted: *“By inviting the local community members to do the presentation”*, and L10J also supported that *“we can call the community to come to school and tell us more about the benefits of traditional food and how it can be preserved”*.

The above statements highlight the learners’ desire for a more enriched learning experience through the active participation of community members and the incorporation of traditional knowledge, thereby fostering a deeper understanding of the subject matter within its cultural context. The learners’ reflections emphasise the significance of community-embedded learning experiences in promoting a holistic and culturally relevant educational environment.

5.5 Comparative Analysis

This section embodies a comparative analysis of the thematic findings derived from the lesson observations, focus group interviews and learners’ reflective journals, to identify any notable differences or similarities in learners’ understanding and engagement with nutrition through traditional food processing and preservation.

Table 5.5: Presents the main themes emerging from the analysis and their source

No.	Theme	Code	Description	Source
1	Integration of Indigenous Knowledge and Modern Science	IK	Connecting previous (local) knowledge with new (modern) science concepts during science lessons.	- Lesson Observations - Focus Group Interviews

2	Knowledge Acquisition	KA	Emphasising learners' understanding of the traditional methods and modern techniques involved in the preservation and processing of food, the benefits and disadvantages of these practices, including the nutritional value, shelf life, potential health implications, etc.	<ul style="list-style-type: none"> - Lesson Observations - Reflective Journals
3	Experiential Learning through Practical/Handson Activities	EL	Engaging in practical, hands-on experiences to understand food processing and preservation.	<ul style="list-style-type: none"> - Lesson Observations - Focus Group Interviews - Reflective Journals
4	Community-embedded Learning Experiences	CL	Emphasising the importance of integrating community knowledge and experiences into the educational process through presentations and discussions to promote a comprehensive and culturally enriched learning environment.	<ul style="list-style-type: none"> - Reflective Journals - Focus Group Interviews
5	Visual Learning Aids for Enhanced Engagement	VL	Using relevant visual representation, such as pictures and posters, to enhance student engagement in scientific lessons.	<ul style="list-style-type: none"> - Focus Group Interviews

The comparative analysis of the thematic analysis from the various instruments, as presented in Table 5 above, revealed significant insights into the learners' understanding and engagement with nutrition through traditional food processing and preservation. The themes derived from the lesson observation, focus group interviews and reflective journals provide a comprehensive overview of the learners' experiences and perceptions.

The "Integration of indigenous knowledge and modern science" theme was recognised across two main sources, namely the lesson observations and focus group interviews,

emphasising the importance of connecting previous local knowledge with new science concepts during the lessons. This indicates a consistent effort to bridge traditional knowledge with modern scientific understanding.

The theme of “Knowledge acquisition” was prominent in the lesson observations and reflexive journals, highlighting learners’ deepened understanding of traditional and modern food preservation and processing methods, including their benefits, disadvantages and potential health implications. This theme was consistently emphasised across these sources.

“Experiential learning through practical/hands-on activities” was a significant theme identified across the lesson observations, focus group interviews and reflexive journals, indicating learners’ strong desire for practical, hands-on experiences to understand food processing and preservation. The learners’ consistent emphasis on practical engagement underscores the importance of experiential learning in this context.

“Community-embedded learning experiences” emerged as an important theme in the reflexive journals and focus group interviews, highlighting the learners’ recognition of the value of integrating community knowledge and experiences into the educational process to promote a comprehensive and culturally enriched learning environment. This theme underscores the importance of community involvement in facilitating a holistic understanding of the subject matter.

“Visual learning aids for enhanced engagement” was a theme identified solely in the focus group interviews, signifying the use of relevant visual representations to enhance student engagement in scientific lessons. While not as prominent as the other themes, it underscores the multifaceted approaches employed to enrich the learning experience.

5.6 Chapter Summary

Chapter Five sought to analyse and present the findings of the study on mediating learning of nutrition through traditional food processing and preservation for Grade 6 rural school learners. The study employed thematic analysis of the focus group interviews, lesson observations and reflexive journals to address these questions. Thematic findings from the data sources revealed that the main factors that can enhance Grade 6 rural school learners’

learning of traditional food processing and preservation include the integration of IK and modern science, experiential learning through practical/hands-on activities, community-embedded learning experiences and visual learning aids through pictures and other visual representation. The next chapter discusses these findings and their implications, linking the research outcomes to previous literature.

CHAPTER SIX: SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION

6.1 Introduction

Chapters Four and Five⁵ presented the findings derived from an in-depth exploration of Grade 6 rural school learners' engagement with nutrition education through traditional food processing and preservation. In the current chapter, I provide a summary of the findings and their implications. In addition, I provide recommendations and areas for future research before discussing the limitations of the study. I conclude the chapter with the conclusion of the study.

6.2 Overview of the Study

The main goal of this interventionist study aimed to investigate how cultural beliefs and practices related to traditional food processing and preservation impact the understanding of nutrition among Grade 6 rural school learners. To achieve this, the following research questions were addressed:

- 1) What knowledge of traditional food preservation and processing do Grade 6 rural school learners know from their homes and community?
- 2) How do the presentations by the IKCs on traditional food processing and preservation and consolidation thereof enable and/or constrain Grade 6 rural school learners from talking about and making sense of the topic of nutrition?
- 3) How does an exemplar lesson that integrates traditional ways of processing and preserving food enable and/or constrain Grade 6 rural school learners from talking about and making sense of the topic of nutrition?

A thematic analysis was employed to address these research questions, drawing insights from the data sources used in the study. For Chapter Four, the data sources consisted of

observations made during the learners' group activities. The study recognised the importance of understanding learners' previous knowledge, as this allowed me to gain valuable insights into their existing understanding. Kuhlane (2011) emphasised the significance of this aspect, while the IKCs emphasised the value of presentation. Chapter Five provided data from the focus group interview (sharing circle), lesson observations and learners' journal reflections. These data sources provided rich and diverse perspectives that contributed to the thematic analysis and the subsequent discussion of the findings.

6.3 Summary of Findings

In this section, I present the main findings of the study as reported in Chapters Four and Five. The findings are structured in a way that directly addresses the research questions, providing insights into the enabling and/or constraining factors for Grade 6 rural school learners when talking and making sense of learning nutrition through traditional food processing and preservation.

6.3.1 Research question one

What knowledge of traditional food preservation and processing do Grade 6 rural school learners know from their homes and community?

First, during the group activities, learners were prompted to share traditional practices related to food processing from their homes or communities. The discussions and interactions within the VG, QG and MGs provided rich insights into the learners' understanding of various traditional methods of food processing.

In the VG, for instance, the primary focus was on traditional corn processing methods. The learners described the preparation of fresh cornbread wrapped in leaves, highlighting the traditional practice of harvesting, grinding and steaming or baking corn flour to create a staple food. The learners' discussions also revealed insights into the cultural beliefs surrounding the use of natural ingredients and the communal nature of food processing activities. For instance, LF5 explained, "*We do not add sugar and yeast because we believe that the fresh corn already has the natural sweetness*". In addition, during the presentation, LM7 asked if there was a difference "*between the amasi of today and the amasi that was eaten in the past*". LF12 replied by saying, "*the amasi that we eat nowadays has an expiry date, whereas, in the past, they always kept it fresh in the calabash*". Similarly, the QG

emphasised the significance of corn in food processing techniques, particularly in the context of breadmaking and its symbolic representation of the agricultural cycle within their community. In contrast, the MG introduced a unique element in their food processing methods by integrating indigenous vegetables like goosefoot (*imbilicane*) and flavour enhancers, such as *intshuku*, showcasing a creative and resourceful approach to traditional food practices.

The findings of this study seem to provide convincing evidence regarding the learners' familiarity with traditional food processing methods, indicating a profound understanding of cultural practices and the use of locally available resources for food preparation. The learners' description of these methods aligns with the existing literature on IK on food practices and cultural knowledge. Previous research has emphasised the importance of preserving and promoting traditional food processing methods to safeguard cultural heritage and improve food security in rural communities (Aluga & Kabwe, 2016). Furthermore, the communal nature of these food activities, as discussed by the learners, resonates with other studies that highlight social-cultural practices. Such practices serve as a platform for intergenerational knowledge transfer and community cohesion (Kuhnein et al., 2013; Sydro et al., 2023).

Secondly, during group activities, learners shared traditional food preservation practices from their homes and communities, which led to the emergence of insightful themes. They provided valuable knowledge about various traditional methods of preserving food. The VG preservation practices were particularly practical, addressing seasonal changes and the need for food storage when resources are scarce. They described methods such as dehydrating leafy vegetables and storing corn in a natural environment using locally available materials, demonstrating their deep understanding of food preservation techniques suited to their community's environmental and cultural context. For instance, LF2 explained the process of preserving corn by digging a hole, smearing it with cow dung, and covering it with a large stone. These findings seem to have an affinity with the recommendation by Asheela et al. (2021) who emphasised the use of available resources.

The MG shared traditional methods of preserving meat, such as salting and placing it on a stick. These techniques have been used since olden days and are still relevant today. Salting meat helps in curing by removing moisture and inhibiting bacterial growth. Placing the

salted meat on a stick aids in air circulation, further assisting the drying process. These practices demonstrate a deep understanding of local environmental conditions and food properties. These methods were developed and perfected over generations, ensuring food availability during times of scarcity, and reflecting the harmonious relationship between people and their natural surroundings.

The learners' description of traditional food preservation methods seems to cohere with the existing literature on indigenous food preservation practices and cultural knowledge. The findings highlight the importance of preserving these techniques to maintain cultural heritage, enhance food security and promote sustainable food systems in rural areas. For instance, D'Andrea and D'Ulizia (2023) stress the need for intergenerational dialogue to ensure the transfer of local food knowledge and the preservation of cultural identity over time.

Thirdly, the analysis of learners' group activities clearly showed that Grade 6 rural school learners are fully aware of the pros and cons of adopting modern techniques of food processing and preservation. In the modern context, the methods of food processing and preservation have changed significantly, reflecting a blend of traditional practices and modern technological advancements. The transition from exclusively traditional techniques to a combination of old and new methods is evident in the approaches mentioned by the VG, QG and MGs. The community's evolution demonstrates its ability to adapt to a changing world and use modern resources while preserving its valuable culinary heritage.

The QG's knowledge and implementation of modern food processing and preservation methods indicate a notable shift towards modern methods. Their expertise in freezing, cooking, peeling and combining ingredients reflects an embrace of technological advancements in the preservation of food. Freezing represents a significant improvement, allowing for long-term storage without compromising flavour or nutritional value. In addition, the practice of combining different ingredients demonstrates a willingness to experiment with flavours and textures as well as understanding of food chemistry.

Learners voiced their concerns regarding the potential health effects of modern food, specifically related to the use of chemicals and extensive processing. They believe that these preservation methods can diminish the nutritional value of food and introduce harmful components. As a result, there is an increasing awareness among rural communities about the

health implications associated with the use of modern food preservation methods. This sensitive consciousness is leading to a more cautious and discerning approach towards adopting these methods.

Overall, the analysis of learners' group activities shows that the integration of IK with modern ways of food processing methods demonstrates the community's ability to adapt to changing food practices while preserving cultural authenticity. Previous studies have emphasised the importance of understanding the interplay between traditional knowledge and modern innovations in food processing and preservation, highlighting the need for culturally sensitive and health-conscious approaches to food preservation and culinary practices (D'Andrea & D'Ulizia, 2023; Geyzen et al., 2019; Makondo & Thomas, 2018; Robles-Pineros et al., 2020).

6.3.2 Research question two

How do the presentations by the IKCs on traditional food preservation and consolidation thereof enable and/or constrain Grade 6 rural school learners from talking about and making sense of the topic of nutrition?

To answer this question, I analysed and discussed the observations made during the presentations delivered by two IKCs. The primary objective of these presentations was to provide the IKCs with a platform to impart their heritage, wisdom and expertise regarding traditional methods of processing and preserving food, with a specific focus on meat, sour milk (*amasi*), grains and leafy vegetables (such as *imithwane*, *iguzu*, *imbikicane* and *intshuku*). Two key themes emerged from the raw data.

The first theme that emerged from the raw data was “*Community-embedded learning experiences*”. The learners were fully engaged with the IK presented by the IKCs, which allowed them to directly connect the community's cultural heritage with their own learning experiences. This community-embedded approach facilitated a direct and interactive exchange of traditional knowledge, enabling the learners to gain a deeper understanding of nutrition through the lens of cultural heritage and indigenous food processing methods. The two IKCs, who were members of the local community, presented lessons on various topics which enabled learners to gain more knowledge on how to preserve and process traditional foods.

Mathawuzela was the first IKC to present and her presentation provided a holistic perspective on the traditional food processing methods and dietary practices of a rural community. The

discussion encompassed the community's reliance on staple foods such as grain, *amasi*, *imifino* and meat, emphasising their deep connection with local resources. The presentation highlighted innovative meat preservation techniques, the central dietary role of corn, the health benefits associated with traditional diets and the cultural and environmental sustainability embedded within these traditional practices. The results appeared to align with Cimi (2019), who propose that traditional leafy vegetables have a high concentration of vital nutrients.

The second IKC, Mbotho, offered profound insights into the community's traditional food storage practices, emphasising their reliance on corn and innovative meat preservation techniques. The use of underground bunkers for meat storage and the method of sealing maize with cow dung and a large stone demonstrated the community's sophisticated understanding of environmental conditions conducive to prolonging the shelf life of perishable goods. In addition, Mbotho shed light on the multifaceted use of corn, particularly in alcohol production, reflecting its cultural and social significance. Furthermore, Mbotho's presentation underscored the health benefits of traditional food preservation methods, aligning with modern nutritional guidelines that emphasise the importance of a diverse diet rich in essential nutrients. The adaptation of traditional methods to modern needs was highlighted, emphasising the potential for developing innovative, sustainable food preservation methods that respect both cultural heritage and modern health standards.

The evidence of IK transfer profited learners as they were actively engaged, asking questions and reacting during the presentations, indicating that the presentations enabled learners to make sense of the topic of nutrition. This interactive approach facilitated a direct engagement with traditional knowledge and practices, enriching the learners' understanding of nutrition through the lens of cultural heritage and indigenous food processing techniques.

These findings are congruent with existing literature that highlights the significance of the community passing down IK and cultural heritage to younger/new generations. For instance, the study by Nikodemus (2017) reported that community members should be involved in the teaching of school science because their knowledge is relevant to everyday life, and the inclusion of IK and practices into Physical Sciences teaching enhances learners' engagement, participation and understanding of scientific concepts related to rates of reactions. Similarly, Shetunyenga's (2019) study revealed that incorporating local knowledge and involving

community members in teaching, especially those with extensive cultural knowledge, has a positive impact on learners' interest and active participation.

The second major theme that emerged from the raw data was “Experiential learning through practical/hands-on activities”. To further reinforce the theoretical knowledge transferred to learners via the presentations, the two IKCs proceeded with practical demonstrations of what they previously presented. They both engaged the learners in practical/hands-on activities, providing them with firsthand experiences related to traditional food processing, preservation and dietary practices. These activities allowed the learners to directly engage with the knowledge imparted during the presentations, enabling them to acquire IK and cultural heritage in a concrete and experiential manner. The integration of practical/hands-on activities in the presentations played a key role in enabling learners to make sense of the topic of nutrition. By actively participating in these activities, the learners were able to deepen their understanding of traditional food practices and immerse themselves in the cultural heritage of local food methods of processing and preserving.

This approach aligns with existing literature, which emphasises the significance of practical, experiential learning in fostering a deeper connection with traditional knowledge and practices, particularly in the context of food and nutrition education. For instance, the study by Mu and Hatch (2019) revealed that the use of a highly structured approach to experiential learning combined with a focus on cultural competencies creates a positive environment and leads to significant focused learning. Dueñas et al. (2022) also found that using practical, hands-on activities allows for a better understanding of the subject, stimulates learners' curiosity and improves the receptiveness of the lesson. Similarly, Rodríguez-Dueñas et al. (2022) also reported that the hands-on activity learning model improves learners' science process skills. Similar results were evidenced by Mubarok (2020), who reported that hands-on activities are effective for critical thinking and active social interaction. The information from their presentations was used to codevelop a lesson plan that integrated IK.

6.3.3 Research Questions Three

How does an exemplar lesson that integrates traditional ways of processing and preserving food enable and/or constrain Grade 6 rural school learners from talking about and making sense of the topic of nutrition?

To address this research question, thematic analysis was conducted on the raw data collected through lesson observations, the focus group interview, and learners' reflexive journals. Thematic findings from the data sources, as presented in Chapter Five, revealed four main factors that can enable and/or constrain Grade 6 rural school learners from making sense of learning nutrition through traditional food processing and preservation.

Firstly, the lesson observations and the focus group interview both revealed that the integration of IK and modern science is key in enriching the learning experiences of Grade 6 rural school learners. By integrating traditional knowledge with modern scientific principles, learners were able to develop a deeper understanding of nutrition through the context of traditional food processing and preservation. This integration served as an enabler for the learners, bridging the gap between traditional wisdom and contemporary scientific knowledge, thereby enhancing their comprehension of the topic.

This theme aligns with existing literature that emphasises the value of integrating IK and modern scientific concepts in education, particularly in the context of promoting cultural relevance and enhancing learners' understanding of diverse knowledge systems. For instance, Erinosh's (2013) study reported that the integration of indigenous scientific knowledge into formal school science instruction enhanced the learning of scientific concepts among students in Nigeria. Another study conducted by Nikodemus (2017) in Namibia indicated that the inclusion of IK and practices, such as the traditional Namibian practice of making *oshikundu*, into the teaching of Physical Science enhances learners' engagement, participation and understanding of the concept of rates of reactions.

The second theme that emerged was "*Experiential learning through practical/hands-on activities*". All the instrument sources, including lesson observations, the focus group interview and reflexive journals, highlighted the significance of experiential learning and hands-on activities in enabling Grade 6 rural school learners to make sense of learning nutrition through traditional food processing and preservation. Engaging in practical demonstrations and hands-on activities provided the learners with tangible experiences related to traditional food

practices, fostering a deeper connection with IK and cultural heritage. This experiential approach served as a facilitator for the learners, enabling them to acquire a practical understanding of traditional food processing and preservation methods, thereby enriching their learning experiences.

The significance of experiential learning through practical activities in fostering a deeper understanding of traditional knowledge and practices aligns with existing literature, emphasising the importance of hands-on experiences in promoting meaningful learning and knowledge acquisition. The study by Dueñas et al. (2022) reported the positive impact of experiential learning on learners' perception and understanding of scientific concepts. Similarly, Soma et al. (2021) used an experiential learning approach during the REM 363 course and reported that it contributed to students' understanding and appreciation of food-related practices.

Another key theme that emerged was “*Community-embedded learning experiences*”. The reflexive journals and the focus group interview both revealed that the involvement of members of the community in the learning process significantly contributed to the understanding of Grade 6 rural school learners. The participation of IKCs and other community members in the learning experiences provided valuable insights into traditional food processing and preservation, enriching the learners' understanding and enabling them to make sense of learning nutrition. This community-embedded approach served as an enabler for the learners, facilitating a direct and immersive engagement with IK and cultural heritage. This approach aligns with the principles of community-based participatory research, which emphasises the active involvement of community members in the educational process to enhance learners' understanding and appreciation of diverse cultural perspectives (Hinckson, 2017; Jacquez et al., 2012; O’Fallon & Dearry, 2002; Valaitis et al., 2022).

The analysis of the focus group interview highlighted the significance of using “*visual learning aids*”, through pictures and other visual representations, to enhance learner engagement and active participation in the learning process. Visual aids served as facilitators for the learners, enhancing their comprehension and enabling them to make sense of learning nutrition through traditional food processing and preservation. The various responses from learners highlighted the recognition of the value of visual learning aids as an effective tool for promoting learner engagement and comprehension of scientific subjects. By emphasising the importance of

incorporating visual aids such as pictures, the learners underscored the potential benefits of enhancing the learning experience through visual representations, which aligns with the principles of experiential and visual-based learning. This theme underscores the significance of using visual learning to facilitate active learning and promote deeper conceptual understanding among learners within the realm of science education.

Scientific studies have provided empirical evidence that visual representations play a significant role in supporting and enhancing learners' engagement, conceptual understanding and reasoning abilities in science classrooms. Yellepeddi and Roberson (2016) conducted a study that demonstrated how incorporating animated videos positively impacted learners' learning experiences and perceptions of the instructional approach. The findings highlighted the benefits of including visual representations in teaching practices as they contribute to increased learner engagement, improved conceptual gains and enhanced reasoning processes.

6.4 Recommendations

Given the above findings, I recommend that IK should be integrated with modern science to provide a comprehensive understanding of nutrition. By combining traditional food practices with scientific knowledge, learners can appreciate the cultural significance of indigenous diets while also understanding the nutritional benefits supported by modern research. This approach fosters a holistic perspective on nutrition that respects and acknowledges the wisdom of traditional food processing and preservation techniques.

I recommend the active involvement of community members, including IKCs, elders and traditional food experts, in both in-school and out-of-school contexts. In addition to regularly visiting the classroom to share their expertise with the learners during natural science lessons, learners could also be taken to the community where these traditional food processing and preservation practices are happening. This inclusive approach will help preserve traditional knowledge, promote intergenerational learning and instil a sense of pride and appreciation for Indigenous food practices. Furthermore, it could strengthen the connection between the school and the local community, fostering a collaborative environment for knowledge sharing.

I also recommend that the curriculum should make some efforts to prioritise experiential learning through hands-on activities. Practical experiences such as traditional food preparation and preservation techniques provide an immersive learning environment where learners can

actively participate, reinforcing their understanding of nutrition and traditional practices. This experiential approach enhances the retention and application of knowledge beyond the classroom.

Lastly, I recommend the use of visual aids such as pictures, posters and other learning and teaching support materials to support the learning process. Incorporating visual aids enhances comprehension, especially when explaining complex concepts related to nutrition and traditional food processing. The use of educational materials provides a tangible and visual reference that complements verbal instruction, catering to diverse learning styles and improving overall knowledge retention.

6.5 Areas of Further Research

Research could focus on conducting longitudinal studies to assess the long-term impact of integrating traditional food practices with nutrition education on the dietary habits and health outcomes of Grade 6 rural school learners. This could involve tracking the learners' dietary choices and health status over several years to evaluate the sustained influence of the educational intervention.

Future research could also explore the cultural and societal perspectives related to traditional food processing and preservation within rural communities. This could involve qualitative studies to understand the broader social, cultural and economic factors that influence the consumption and preservation of traditional foods.

Future research could explore the use of augmented reality and virtual reality technologies to create immersive learning experiences that allow learners to virtually explore traditional food processing methods and understand the nutritional benefits of indigenous foods.

6.6 Limitations to the Study

The following are the limitations of the study that could hinder its accomplishment and the generalization of the findings. One significant limitation was the small sample size of participants. Conducting research with a small sample of Grade 6 rural school learners could limit the findings to a broader population and could impact the statistical power of the study, while also making it challenging to draw robust conclusions about the effectiveness of the educational interventions.

A potential limitation of the study could be the lack of follow-up to provide feedback to the IKCs. This could have impacted the opportunity to acknowledge and share the study's outcomes with the community members who contributed their traditional knowledge. Future research could consider establishing a mechanism for providing feedback to the custodians to ensure a more reciprocal and respectful exchange of knowledge.

6.7 My Personal Reflections

I enrolled at Rhodes University in 2017 for the BEd programme in Science Education. However, the journey was challenging. We started as 48 students, and by the following year, our number had drastically dropped to 28 as some students from our class were excluded in 2018. The fear of being excluded the following year was constantly present as evidenced by our statement “Who is next?”. In 2018 things became even tougher for me as my mother’s illness worsened day by day. Balancing the responsibilities of being a student, teacher and parent proved to be incredibly difficult.

During this time, we were fortunate to have Prof. Ngcoza and Dr Mutanho join us as our new coordinators, as our previous coordinator was on sabbatical leave. They consistently encouraged us and stressed the significance of working as a collective. Dr Mutanho introduced us to the concept of integrating IK into science lessons. Although the term ‘IK’ was new to me, it is mentioned in the CAPS document. However, during the departmental workshops conducted by the subject advisor, we were not trained on how to integrate IK into science lessons. Instead, the emphasis was only on how to use specific aims when we teach science and they also lasted only for two days. Following the workshops, we were expected to implement CAPS in our classrooms. Despite this, I was intrigued by the emphasis on traditional knowledge and the integration of cultural beliefs that can make science more interesting to learners. Unfortunately, we neglected to consider the learners’ prior everyday knowledge when we taught science and taught science that was abstract to learners. To close this gap, Dr Mutanho extended an invitation to an IKC (Mama Noling) to demonstrate the process of making *umqombothi*. Her presentation reminded me of how *umqombothi* was prepared at home and its readiness for sieving was determined by igniting a match on top of it. When the light goes out, it indicates that it is ready for sieving. This demonstration highlighted how scientific concepts are embedded within *umqombothi* reaffirming that our parents possess scientific knowledge. The presentation by Mama Noling, the IKC of IK, showcased her expertise in making

umqombothi by confidently explaining each step of the process. As a symbol of respect for her ancestors, she proudly wore a scarf around her waist. The presentation made me realise that there was a wealth of untapped scientific knowledge within the community. Reflecting on my past experiences as a science teacher, I now acknowledge that I did not value the sociocultural backgrounds of my learners in my science lessons as reiterated by Mavuru and Rammarain (2020).

This study provided a revelation to me regarding the significance of indigenous practices that I had unknowingly ignored in my science lessons. The presentations by the IKCs served as a prime example, as I gained insight into how traditional food processing and preservation methods could be used to enhance the learning of nutrition. This study highlighted for me the crucial role of home language as an enabler in the teaching of science, as emphasised in the work of Msimanga and Elliot (2014). In addition, it showcased how social interactions during group activities can provide opportunities for learners to engage in argumentation, as discussed by Ogunniyi (2007a).

This study brought to my attention the importance of employing the learner's home language as a medium for teaching science. It accentuated the idea that the use of home language can serve as a valuable enabler in the process of imparting scientific knowledge. The involvement of IKCs in the study enlightened me about the value of their knowledge and how it can be effectively integrated into science lessons. As a result, this exposure and firsthand experience significantly contributed to my academic and professional growth as both a scholar and a teacher.

I was fortunate to have supportive and inspiring supervisors Prof. Ngcoza and Dr Mutanho as well as wonderful colleagues within my community of practice. Together, we provided each other with unwavering support and motivation, continuously sharing valuable resources and knowledge to foster our personal and professional development. Finally, I think this research has provided valuable insights and broadened my perspective in numerous ways. Despite encountering challenges along the way, especially with ethics clearance, the experience gained has prepared me well.

6.8 Conclusion

The main goal of this study was to mediate the learning of nutrition for Grade 6 rural school learners by integrating traditional ways of food processing and preservation. The study aimed to highlight the enablers and/or constraints that influence the understanding and learning experiences of the learners, both before and after the intervention. The thematic analysis of the data revealed valuable insights into the factors that shape the learning experiences of Grade 6 rural school learners. The findings underscored the significance of integrating IK with modern scientific principles, engaging in experiential and hands-on learning activities, involving community members and IKCs and using visual learning aids to enhance learners' engagement.

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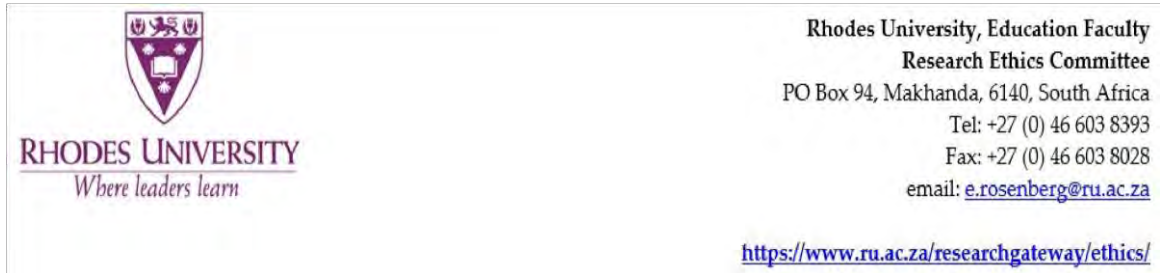
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Appendices

Appendix A: Ethics Clearance

9 September 2023

Prof Kenneth Ngcoza



Education Department

K.Ngcoza@ru.ac.za

Dear Prof Kenneth Ngcoza and Ms Nomvume Tyeda

Re: Mediating Learning of Nutrition through Traditional Food Processing and Preservation to Grade 6 Rural School Learners

APPLICATION NUMBER: 2023-7185-7853

This letter confirms that your research ethics application has been reviewed and **APPROVED** by the Education Faculty Research Ethics Committee (EF-REC). Your permission letter(s) where applicable have been received and you are free to proceed with your study. Approval is granted for 1 year. An annual progress report is required in order to renew approval for an additional period. You will receive an email notifying you when the progress report is due.

Should any substantive change(s) be made during the research process, that may have ethical implications, you should notify the Education Faculty REC Chair via email. This includes changes in investigators. The REC Chair will advise as to whether a new application is necessary.

Do keep this clearance letter secure and accessible throughout your study and after its completion. It will be needed when a thesis is examined and when publications are submitted to journals. Please also submit a brief report to the REC Chair on the completion of the research. This can be done via email. The purpose of this report is to indicate whether the research was conducted successfully and whether any ethics-related matters arose that the committee should be aware of, in order to guide future studies. Sincerely,

A rectangular box containing a handwritten signature in cursive script, which appears to read "E. Rosenberg".

Prof Eureka Rosenberg

Chair: Education Faculty Research Ethics Committee

Appendix B1: Letter to the Eastern Cape Department of Education

The Director: Corporate Planning, Monitoring and Research Coordination

Eastern Cape Department of Education

Private Bag X 0032

Bisho

5605

Dear Sir / Madam

Subject: Request for Permission to Conduct Educational Research with Grade 6 learners at Buzongoma Junior Secondary School in OR Tambo Coastal District

I am Tyeda Nomvume (Student number:17T2522), a part- time student doing Masters in Science Education with Rhodes University, South Africa and a Departmental Head Buzongoma Junior Secondary School. I am a Natural Sciences and Mathematics teacher Buzongoma Junior

Secondary school. I hereby humbly request your permission to conduct research study with Grade 6 learners at Buzongoma Junior Secondary School which is in your District. I plan to conduct the study in August 2023 the study will be mediating learning of nutrition through traditional food processing and preservation to grade 6 rural school learners. The study will require the Grade 6

Natural Sciences and Technology learners to be co-researchers with me. They will be required to

- Interact with the two community members who will be presenting about indigenous knowledge and related to traditional ways of processing and preserving food.
- Present in class

I will seek permission from the parents or guardians of the learners and agreement from the learners to participate in the research. I will also work with a Grade 8 Natural Sciences teacher who will be my critical friend in this study. She will observe the two community members who will share traditional ways of preserving and processing

food. She will also be requested to indicate that she agrees to be part of the study and that she understands what her role will be.

I would like to assure your office that, should I be granted permission, the research ethics will apply throughout the process of the study. The data collected (hard and soft copies) will be kept in the school safe in the strong room for at least a period of five years. The data collected will be used for reporting in my thesis and publications. I am aware that there might be not complete anonymity because we will be co- creating knowledge with participants in this study, but I want to reassure you that ethical standards will be upheld at all times.

I can be reached at 083 478 4926 or email (nomvume2013@gmail.com)

Note: My supervisor Prof. Kenneth M. Ngcoza at Rhodes University, email address (kngcoza@ru.ac.za) My co- supervisor is Dr. Chrispen Mutanho email address (chrispenmotahno@gmail.com)

Your consideration will be highly appreciated in this regard

Yours sincerely

Tyeda N

Rhodes University, Research Office, Ethics

Ethics Coordinator: ethics-committee@ru.ac.za

T: +27 (0) 46 603 7335 F: +27 (0) 82 739 4378

Room 220, Main Admin Building, Drostdy
Road, Makhanda 6139

Appendix B2: Letter to the Principal of Buzongoma Junior Secondary School

The Principal

Buzongoma Junior Secondary School

O.R. Tambo District

Port St Johns

Umtata

5400

Dear Miss

Subject: Request for Permission to Conduct Educational Research with Grade 6 learners at Buzongoma Junior Secondary School in O.R Tambo District.

I am Tyeda Nomvume (Student number:17T2522), a part- time student doing Masters in Science Education with Rhodes University, South Africa and a Departmental Head of Buzongoma Junior Secondary School. I am a Natural Sciences and Mathematics teacher at Buzongoma Junior Secondary school. I hereby humbly request your permission to conduct a research study with learners at Buzongoma Junior Secondary School which is in your District. The study will be mediating learning of nutrition through traditional food processing and preservation to grade 6 rural school learners. The study will require the Grade 6 Natural Sciences learners to be co-researchers with me. They will be required to

- Interact with the two community members who will be presenting about indigenous knowledge related to traditional food preserving and processing.
- Present in class.
-

A written consent will be sought from the parents or guardians of the learners and the learner themselves. I will also work with a Grade 8 Natural Sciences teacher who will be my critical friend in this study. He will observe the community members who will share traditional ways of preserving and processing food to make sense about nutrition. I plan to conduct research in August 2023. I would like to assure your office that, should I be granted permission, the research ethics will apply throughout the process of the study. The data collected (hard and soft copies) will be kept in the school safe in the strong room for at least a period of five years. The data collected will be used for reporting in my thesis and publications. The identity of the participants and their views will be treated with high degree of confidentiality and anonymity.

Your consideration in this regard will be highly appreciated.

Yours Sincerely

Tyeda N. (Departmental Head of Buzongoma Junior Secondary School and Rhodes University Student)

I can be reached at 083 478 4926 or email (nomvume2013@gmail.com)

Note: My supervisor Prof. Kenneth M. Ngcoza at Rhodes University, email address (kngcoza@ru.ac.za) My co-supervisor is Dr. Chrispen Mutanho email address (chrispenmotahno@gmail.com)

Your consideration will be highly appreciated in this regard. Yours sincerely Tyeda N.

Rhodes University, Research Office, Ethics

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Room 220, Main Admin Building, Drostdy Road, Grahamstown 6139

Appendix B3(a): Letter to the Natural Sciences Teacher (Critical Friend)

Enquiries: Ms Tyeda N

Cell number: 0834784926

Dear (Teacher Name)

Re: Participation in research on the integration of local or indigenous knowledge when teaching the topic on nutrition in the Grade 6 Natural Sciences class

I am Tyeda Nomvume (Student number: 17T2522), a part-time student doing Masters in Science Education at Rhodes University, South Africa. I am a Departmental Head and a Mathematics and Natural Sciences teacher at Buzongoma Junior Secondary School in O.R Tambo Coastal District. I hereby humbly request your permission to conduct a research study with learners at Buzongoma Junior Secondary School which is in your District. The study will support Grade 6 rural school learners to mediate learning of nutrition through traditional food processing and preservation with a view to contextualise and enhance learning. The Grade 6 Natural Sciences learners will be co-researchers in this study. They will be required to (a) collect data from community members, (b) present in class, (c) interact with two community members who will be presenting about indigenous knowledge and related cultural practices about nutrition, and these activities will be observed and videotaped. Your role will be to assist videotape the lessons, assist in co-planning of lessons that include indigenous knowledge and assist observe my lessons since I cannot observe my own lessons. I will videotape and interview the learners and the community members. A written consent will be sought from the parents or guardians of the learners' and the learners themselves. I will also work with a Grade 8 Natural Sciences teacher to observe the two community leaders who will tell the stories about cultural beliefs and practices about nutrition. In addition, you will be required to check and verify the findings of the study, this help I validating the findings. I plan to conduct the study in August 2023

The study will focus on mediating learning of nutrition through traditional food processing and preservation to grade 6 rural school learners. Kindly be informed that participation in this study is voluntary. It is therefore your right to decide whether you wish to participate or not. Also, participants are free to withdraw at any time as they wish to do so. The identity and views of the participants will not be revealed, and I will maintain anonymity, and data that will be collected will not be used for other purposes apart from this study. Should you agree to participate in the study, you are reminded that all information and data collected during the study must be kept confidential. The research ethics will apply throughout the process of the study. The data collected (hard and soft copies) will be kept in the school safe in the strong room for at least a period of five years. The data collected will be used for reporting in my thesis and publications.

I can be reached at 0834784926 or email, address I (nomvume2013@gmail.com)

Note: My supervisor Prof. Kenneth M. Ngcoza at Rhodes University, email address (kngcoza@ru.ac.za)

My co- supervisor is Dr. Chrispen Mutanho email address (chrispenmotahno@gmail.com)

Your consideration will be highly appreciated in this regard. Lastly, if you agree or do not agree to participate in this research, please complete the consent form below.

Yours Sincerely

Tyeda N

Rhodes University, Research Office, Ethics

Ethics Coordinator: ethics-committee@ru.ac.za

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Room 220, Main Admin Building, Drostdy Road, Grahamstown

6139

Appendix B3(b): Informed Consent Letter for Critical Friend

RESEARCH PARTICIPANT INFORMED CONSENT LETTER

(CRITICAL FRIEND)

PROJECT TITLE: **Mediating learning of nutrition through traditional food processing and preservation to grade 6 rural school learners.**

Nomvume Tyeda (17T2522), currently a Masters student at Rhodes University, has requested my permission to participate in the above-mentioned research project. The nature and purpose of the research project and of this informed consent declaration have been clearly explained to me in a language that I understand.

I am therefore aware that:

1. The purpose of this interventionist study is to mediate learning of nutrition through traditional food processing and preservation to grade 6 rural school learners.
2. I will observe together with the researcher, learners when they participate, interact and argue during the demonstration of traditional food processing and preservation by the community members. The presentation will take place in an out-of-school context, at one of the homes of the expert community members and videotape the presentation with permission from participants. This will take place after school hours to avoid disturbing tuition time.
3. That I will be observing the researcher when presenting a lesson in a Grade 6 Natural Sciences and Technology class. This will take place during school hours when I do not have periods. The lesson will take two hours.
4. By participating in this research project, I will contribute to knowledge and understanding how the practical demonstrations by expert community members have facilitated my knowledge which I will use to develop videos that contain IK.

5. My participation is entirely voluntary and should I at any stage wish to withdraw from further participation, I may do so without any prejudice.
6. I understand that participating in this study is voluntary and that I will not be compensated for participating.
7. The names of participants will be blocked in the thesis itself, unless if they express in writing their willingness to have their names included in the study.
8. There may be risks associated with my participation in the project. I am therefore aware of the following steps:
 - a) All information shared in the group is strictly confidential and will not be used for purpose other than of the above mentioned research project;
 - b) All the data collected will be kept in a locked cupboard and electronic data will be kept in a computer and hard drive only accessible through a secure password kept by me; and
 - c) The researcher intends to publish the research findings in the form of a thesis towards a master's degree in Science Education, and later present it in conferences or journal articles. However, confidentiality will be maintained.
9. Any further questions that I might have concerning the research or my participation will be answered by the Rhodes Masters student (nomvume2013@gmail.com) or the supervisor Professor Kenneth Mlungisi Ngcoza (k.ngcoza@ru.ac.za) and co- supervisor Doctor Chrispen Mutanho (chrismutanho49@gmail.com)
10. By signing this informed consent declaration, there are no legal implications.
11. A copy of this informed consent declaration will be kept in a safe place by the researcher.

I,have read the above information or confirm that the above information has been explained to me in a language that I understand. I am therefore aware of this document's contents. I have asked all questions that I wished to ask, and these have been answered to my satisfaction. I fully understand what is expected of me during the research.

I have not been coerced or pressurised in any way, and I understand that anonymity might not be possible because we will be co-creating knowledge in this study. I therefore voluntarily agree to participate in the above mentioned research project.

.....

Participant's signature Witness

Date Date

Rhodes University, Research Office, Ethics

Ethics Coordinator: ethics-committee@ru.ac.za

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Room 220, Main Admin Building, Drostdy Road, Makhanda, 6139

Appendix B4(a): Letter to the Community Members

Enquiries: Ms Tyeda N.

Cell number: 0834784926

Dear Sir

RE: PERMISSION LETTER: PRESENTATION AT BUZONGOMA JUNIOR SECONDARY SCHOOL

I am Tyeda Nomvume a part- time student doing master's in science education with Rhodes University, South Africa and a Departmental Head of Buzongoma Junior Secondary School. I am a Natural Sciences and Mathematics teacher at Buzongoma Junior Secondary School. I hereby humbly request your permission to be a research participant in my research project that I will be conducting with my Grade 6 Natural Sciences and Technology learners at Buzongoma Junior Secondary School. The focus of the study will be mediating learning of nutrition through traditional food processing and preservation to grade 6 rural school learners.

I would like you to make a presentation on the traditional methods of food preserving and processing for my Grade 6 Natural Sciences and Technology learners. I would also like you to be the part of interviews after the presentation on traditional methods. These presentation will be videotaped. The purpose for this is to contextualise and enhance learning of the topic nutrition. Informed consent will be sought from the learners and from learners' parents or guardians. I plan to conduct research in August 2023.

Your participation in this study is completely voluntary and you can withdraw at any stage you wish. I will ensure that your identity is treated with high degree of confidentiality and anonymity.

I henceforth request you to indicate your choice by making an (X) in an appropriate box below.

Agree

Not agree.

Signature:.....

I can be reached at 0834784926 or email, address 1 (nomvume2013@gmail.com)

Note: My supervisor Prof. Kenneth M. Ngcoza at Rhodes University, email address (kngcoza@ru.ac.za)

My co-supervisor is Dr. Chrispen Mutanho email address (chrispenmotahno@gmail.com) Your cooperation will be highly recommended in this regard.

Yours
sincerely
Tyeda N.

Rhodes University, Research Office, Ethics

Ethics Coordinator: ethics-committee@ru.ac.za

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Room 220, Main Admin Building, Drostdy Road, Grahamstown 613

Appendix B4(b): Translation

Mnumzana obekekileyo,

Igama lam ngu Tyeda Nomvume umfundisi ntsapho kweNzululwazi neZibalo eBuzongoma Junior Secondary School. Ndicela ukuba ube yinxalenye kuphando olunxulumene nezifundo zam zakwiDyunesi yase Rhodes. Uphando lwam ndizakulwenza eBuzongoma Junior Secondary School. Oluphando lunxulumene nokuphanda ukuba umdla wabafundi ungakhula okanye udodabale kusini na xa kufundiswa eZenzululwazi kwibanga leSithandathu kudityaniswa ulwazi nenkcubeko efumaneka eluntwini nasekuhlaleni ngokubanzi xa kufundiswa ngendlela ekunogcinwa ngako ukutya ixesha elide kungonakali kusetyenziswa indlela zamandulo kuphinde kusilwe.

Oluphando luzakugxila kakhulu ekufundiseni nokucacisela abafundi notitshala weNzululwazi ukuba luthini ulwazi lwabo malunga nokulamla ukufunda ngesondlo ngokulungiswa kokutya kwesintu kunye nokugcinwa. Injongo ephambili yoluphando kukufumanisa ukuba kunakho kusini na ukuhlanganiswa kolwazi lwemveli neZenzululwazi yase Ntshona, ukuzama ukukhulisa umdla wabafundi kweZenzululwazi. Ndiyazithoba ndikucela kanaanjalo ukuba uzokusifundisa, ngolwazi lwemveli ngokugcinwa kokutya ixesha elide.

Ndakuvuyiswa yinxaxheba yakho koluphando. Imithetho yeDyunivesiti ke ayibopheleli abathathi nxaxheba lonto ithetha ukuba banakho ukurhoxa nangaliphina ixesha befuna. Ndiyakuqinisekisa nakanjalo ukuba ulwazi olufumaneka koluphando aluyikiniwa nabanina ngaphandle kwemvume yakho. Ukanti, igama lakho aliyikuchazwa esidlangalaleni ngaphandle kwemvume yakho. Siye ke safumanisa ukuba masenze oluphando lokuba sazi ukuba yintoni eyenza umdla nendlela abacinga ngayo abantwana xa beyinxalenye kusenziwa uphando nzulu kwizifundo zeNzululwazi ingakumbi kwintlobo ntlobo zendlela zokugcina ukutya..

Ukuba unombuzo malunga noluphando, nceda uqhagamshelane nam kulo mnxeba, 0834784926, nomvume2013@gmail.com okanye iingqonyela zam endiphantsi kwazo uProf. Kenneth M. Ngoza, kngcoza@ru.ac.za okwisebe lezeMfundo kwiDyunivesiti yase Rhodes okanye umncedisi wakhe uGqirha Chrispen Mutahno.

Ndibamba ngazo zozibini

Ndiyakucela kwakhona ukuba uncede uzalise esisiqendu silandelayo.

Mna Mnumzana..... (igama lakho)

Ndiyavuma OKANYE Andivumi (khentha ngokufakela X)
kwibokisi

Tyikitya.....

Rhodes University, Research Office, Ethics

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Appendix B5: Letter to the Parent(s)/Guardian(s)

Enquiries: Ms. Tyeda N.

Cell number: 0738399536

Dear Sir

RE: Participation in research on the integration of local indigenous knowledge when teaching the topic nutrition in the Grade 6 Natural Sciences and Technology class.

I am Tyeda Nomvume a part-time student doing Masters in Science Education with Rhodes University, South Africa and Departmental Head of Buzongoma Junior Secondary School. I am a Natural Sciences and Mathematics teacher at Buzongoma Junior Secondary School. I hereby humbly request your permission to conduct a research study with your child who is studying at Buzongoma Junior Secondary School.

The focus of the study will be mediating learning of nutrition through traditional food processing and preservation to grade 6 rural school learners. Kindly be informed that participation in this study is voluntary. It is therefore the right of the parent(s) to decide whether his/her child should participate or not. Also, participants are free to withdraw at any time as they wish to do so. The identity and views of participants will be treated with high degree of confidentiality and anonymity, and the data that will be collected will not be used for other purposes apart from this study.

If you have any questions about the research, please feel free to contact me at 0834784926, (nomvume2013@gmail.com) or my supervisor Prof. Kenneth Ngcoza at k.ngcoza@ru.ac.za and Dr Chrispen Mutanho at chrispenmutanho@gmail.com.

Lastly, if you agree for your child to participate in this research, please complete the consent form below.

I..... (full name of parent/ guardian), hereby confirm that I understand the content of this document and the nature of the research. I hereby give permission to..... (Name of the child) to participate in the study.

Yours Sincerely

Tyeda N.

Rhodes University, Research Office,

Rhodes University, Research Office, Ethics

Ethics Coordinator: ethics-committee@ru.ac.za

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Appendix B6(a): Letter to the Learner

Enquiries: Ms Tyeda N

Cell number: 0834784926

Dear (Learner Name)

Re: Participation in research on the integration of the local or indigenous knowledge when teaching the topic on nutrition in the Grade 6 Natural Sciences and Technology class

I am Tyeda Nomvume, a part-time student doing Masters in Science Education at Rhodes University, South Africa. I am Mathematics and Natural Sciences teacher at Buzongoma Junior Secondary School. I hereby humbly request your permission for me to conduct a research study with you as my co-researcher, during teaching and learning of the topic of nutrition. The study will mediate learning of nutrition through food processing and preservation and practices on traditional foods with a view to contextualise and enhance learning of nutrition and the Grade 6 Natural Sciences learners' will be co-researchers in this study. You will be required to (a) collect data from community members, (b) present in class, (c) interact with two community members who will be presenting about indigenous knowledge and related cultural practices about nutrition, and these activities will be observed and videotaped. I will videotape and interview the learners and the community members. A written consent will be sought from the parents or guardians of the learners' and the learners themselves. I will also work with a Grade 8 Natural Sciences teacher to observe the two community leaders who will tell the stories about cultural beliefs and practices about nutrition. I plan to conduct the study in August 2023.

The focus of the study is to mediate learning of nutrition through traditional food processing and preservation to grade 6 rural school learners. I would like to assure you that, should I be granted permission, the research ethics will apply throughout the process of the study. Kindly be informed that participation in this study is voluntary. It is therefore your right to decide whether you wish to participate or not. Also participants are free to withdraw at any time of the study as they wish to do. The data that will be collected will not used for other purposes apart from the study. Please note: Extra support and activities such as worksheets, video lessons and other relevant teaching materials will be made available for all those learners who do not wish to be part of this research and they will not be disadvantaged in any way.

I can be reached at 0834784926 or email (nomvume2013@gmail.com) Note: My supervisor Prof. Kenneth M. Ngcoza at Rhodes University, email address (kngcoza@ru.ac.za) My co- supervisor is Dr. Chrispen Mutanho email address (chrispenmotahno@gmail.com). Lastly, if you agree or do not agree to participate in this research, please complete the consent form below. Your cooperation will be highly appreciated in this regard.

Yours sincerely

Tyeda N

Rhodes University, Research Office, Ethics

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Appendix B6(b): Child Participant Assent Form

CHILD PARTICIPANT'S ASSENT FORM

INFORMED CONSENT DECLARATION

(Child participant)



Project Title: Mediating learning of nutrition through traditional food processing and preservation to grade 6 rural school learners.

Researcher's name: Tyeda Nomvume

Name of participant:

1. Has the researcher explained what s/he will be doing and wants you to do?

YES

NO

2. Has the researcher explained why s/he wants you to take part?

YES

NO

3. Do you understand what the research wants to do

YES

NO

4. Do you know if anything good or bad can happen to you during the research?

YES

NO

5. Do you know that your name and what you say will be kept a secret from other people.

YES

NO

6. Did you ask the researcher any questions about the research?

YES

NO

7. Has the researcher answered all your questions?

YES

NO

8. Do you understand that you can refuse to participate if you do not want to take part and that nothing will happen to you if you refuse?

YES

NO

9. Do you understand that you may pull out of the study at any time if you no longer want to continue?

YES

NO

10. Do you know who to talk to if you are worried or have any other questions to ask?

YES

NO

11. Has anyone forced or put pressure on you to take part in this research?

YES

NO

12. Are you willing to take part in the research?

YES

NO

Signature of Child

Date



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Appendix B6(c): Translation

Mfundi obekekileyo (Igama lomfundi)

Igama lam ndingu Tyeda Nomvume umfundisi-ntsapho we Zibalo ne Nzululwazi e Buzongoma Junior Secondary School. Ndicela ukuba uvumele umntwana wakho ukuba athathe inxaxheba kuphando kwi zifundo zam zakwi Dyunivesithi yase Rhodes. Uphando lwam ndizakulwenza eBuzongoma Junior Secondary School, lunxulumene nokuphanda ukukhulisa umdla wabafundi xa kufundiswa iNzululwazi kwibanga lesithandathu. Kulo phando kuzakudityaniswa ulwazi nenkcubeko olufumaneka eluntwini nasekuhlaleni jikelele xa kufundiswa iindidi zokutya.

Oluphando luzakuthatha izigaba ezintathu. Sigxile kakhulu ukufundisa nokucacisela abafundi notitshala weNzululwazi ukuba luthinina ulwazi lwabo malunga nokulamla ukufunda ngesondlo ngokulungiswa kokutya kwesintu nokugcinwa. Injongo ephambili yoluphando kukujonga ukuba kungakwazi na ukuhlanganiswa ulwazi lwemveli neNzululwazi yase Ntsona, ukuzama ukukhulisa umdla wabafundi kwezeNzululwazi. Ndiyazithoba ndikwakucela kanjaqo ukuba uzokusifundisa, ngolwazi lwemveli ngentlobo zokutya kwakunye neendlela ezazisesetyeniswa mandulo ekugcineni oku kutya ixesha elide kungonakali.

Ndakuvuyiswa yimvume yakho koluphando. Imithetho ye Dyunivesithi ke ayibopheleli abathathi nxaxheba lont ithetha ukuba banako ukurhoxa nanini na xa befuna njalo. Ndiyakuqinisekisa nakanjalo ukuba ulwazi olufumaneke koluphando aluyikunikwa nabanina ngaphandle kwemvume yakho. Ukanti, igama lakho aliyichazwa esidlangalaleni ngaphandle kwemvume yakho. Ukuba uyavuma eyakho indima iyakuquka, (a) ukufilisha imibuzo yophando, (b) uyokufuna ulwazi kubantu abadala ekuhlaleni olungqamene noluphando, (c) wabelane nabanye abafundi eklasini ngophando lwakho, kwa (d) ubeyinxalenye yabafundi abazakufundiswa ziingcali zasekuhlaleni ngolwazi lwemveli olunxulumene noluphando, uzibuzele imibuzo kubo. Siye ke safumanisa ukuba masenze oluphando lokuba sazi ukuba yintoni eyenza umdla nendlela abacinga ngayo abantwana xa beyinxalenye kusenziwa uphando nzulu kwizifundo zeNzululwazi ingakumbi kwintlobo ezithile zokutya kwasekhaya.

Ukuba unombuzo malunga noluphando, nceda utsalele umxeba kum kolu cingo 0834784926, nomvume2013@gmail.com, okanye ingqonyela nengqonyelakazi endiphantsi kwazo uProf. Kenneth M. Ngcoza kulomxeba 046 603 7269, k.ngcoza@ru.ac.za okwiSebe lwezeMfundo kwi Dyunivesithi yase Rhodes, okanye uGqirha Chrispen Mutanho, chrispenmotahno@gmail.com naye okwiSebe lwezeMfundo kwi Dyunivesithi yase Rhodes.

Ndiyakucela kanaanjalo ukuba uncede uzalise esi siqendu silandelayo

Ozithobileyo Tyeda

N.

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CHILD PARTICIPANT'S ASSENT FORM

INFORMED CONSENT DECLARATION

(Child participant)



Isihloko sophando : *Ukulamla ukufunda kwesondlo ngokulungiswa kokutya kwesintu kunye nokugcinwa.*

Igama lomphandi : Ms Nomvume Tyeda

Igama lomthathi-nxaxheba :

1. Ingaba umphandi ukucacisele yonke into azokuyenza kwakunye nafuna wena uyenze?

EWE

HAYI

2. Ingaba umphandi ukucacisele na ukuba kutheni efuna wena uthathe inxaxheba?

EWE

HAYI

3. Uyayiqonda na into ezanywa ekwenziwa ngoluphando?

EWE

HAYI

4. Ucinga ukuba ingakhona into entle okanye embi engathi ikwahlele ngelixesha loluphando?

EWE

HAYI

5. Uyayazi ukuba igama lakho nezinto ozozitsho koluphando azizokuboniswa abanye abantu?

EWE

HAYI

6. Umbuzile umphandi imibuzo nayiphi ngoluphando?

EWE

HAYI

7. Ingaba umphandi uyiphendule yonke imibuzo yakho?

EWE

HAYI

8. Uyaqonda ukuba ungangavumi ukuthabatha inxaxheba koluphando ukuba uyafuna, kwaye akukho nto izakwehlela ukuba akuvumanga?

EWE

HAYI

9. Uyaqonda ukuba ungayeka ukuthabatha inxaxheba koluphando nanini na xa uziva ungafuni ukuqhubeka?

EWE

HAYI

10. Uyazazi ukuba ungathetha nabani xa uziva ukhathazekile okanye unemibuzo ngoluphando?

EWE

HAYI

11. Ukhona umntu okunyanzelisa ngokuthabatha inxaxheba koluphando?

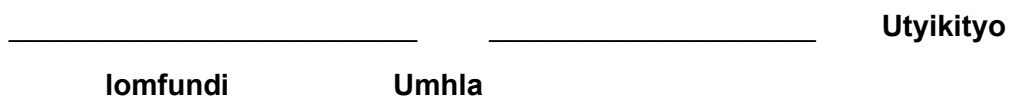
EWE

HAYI

12. Uyavuma ukuthabatha inxaxheba koluphando?

EWE

HAYI



Appendix C: Time Frame of Study

Date	What to do
Jan–Feb 2022	Writing of research proposal
April–June 2022	Submission of refined research topic
July–Sept 2022	Submission of the first draft research proposal
October–November 2022	Submission of final research proposal
Jan–Feb 2023 3	Submission of second research draft proposal
May- June 2023	Re-submission of research proposal to High Degree Committee
July 2023	Draft chapters 1-4 write up
Agust 2023	Data collection and analysis
August - September 2023	Data presentation and write up
October 2023	Full thesis first draft

November – December 2023	Full thesis second draft, editing and proof reading
January –February 2024	Submission of final thesis to supervisor and editing of thesis

Appendix D: Data Collection Methods

Stage	Method to be used to gather data	Purpose	Research questions
Stage 1	Focus Group Interview (sharing circles)	To find out learners limitations and restrictions in learning the topic of nutrition. To found how learners reaction after the presentation by community members.	1 &3
Stage 2	Group Activity	To find out learners' prior knowledge. To find information from the local community about traditional ways of processing and preserving food.	2
Stage 3	Participatory and observation	To find out the impact of integrating IK in science lessons To find the learners interact, talk and make sense of learning during the presentation by community members.	2&3
Stage 4	Journal reflection	To find out the influence of practical demonstration by the community members and lesson that integrate IK in science teaching.	2 & 3

Appendix E: Group Activity Questions

1. What are some traditional practices that you know from your home or community related to food processing?
2. What are some traditional practices that you know from home or community related to food preservation?
3. Why do we process and preserve food?

Appendix F: Observation Schedule (Adapted from Nikodemus, 2017)

Research Question 3:

What learning opportunities are created (or not) for Grade 6 Natural Sciences and Technology learners during the practical demonstrations of the indigenous knowledge of processing and the preserving of food by Indigenous Knowledge Custodians?

Name of the school..... Observation Date Grade...

Subject: Number of Learners:

Lesson Topic: Observer:

Social interactions	Remarks
The participation of learners during the presentation by the community members	
The interaction of learners with one another	
The interaction of learners with the community members	
How community members take learners' views	
How learners are motivated in the presentation	
Learners' courage to respond to their peers ideas and discussion	
How learners treat one another	
Learners' courage to respond to their peers' thoughts and discussion	
Language	Remarks
The use of mother tongue and how it impacts on participation	
How home language is used in class	

How learners' everyday experiences and ways of talking and knowing are expressed during the presentation by community members.	
Learner engagement and sense making	Remarks
The involvement of learners in active learning	
How community members are sharing information or knowledge	
Learners' openness and interest in the presentation by community members	
Learners' question and eagerness to learn	
Learners' interpretation of concepts during the presentation	
Learners sense – making enable and / or constrain as a result of the practical demonstration	

Appendix G: Focus Group Interviews (Sharing Circles)

The researcher is interested to find if integration of Indigenous Knowledge (IK) has the impact when teaching the topic nutrition.

Researcher: What do you understand by local knowledge?

Learner:

Researcher: Could tell me how do you learn science at school?

Learner:

Researcher: What relevance does local knowledge from your home or community have at school?

Learner:

Researcher: What traditional practices at your home or community do you know of? How are these related to Science taught at school?

Learner:

Researcher: In what ways are science concepts of preserving and processing relevant to your everyday life?

Learner:

Researcher: Could you please tell me how should the topic nutrition (preserving and processing) can be taught and learned?

Learner:

Researcher: What else would you like to share with me regarding the integrating of local knowledge in science lessons after the presentation by Indigenous Knowledge Custodians?

Learner:

Appendix H: Journal Reflections

Instruction: Answer all the following questions

1. What have you learned from this lessons?

.....
.....
.....
.....
.....

2. What have you learnt from the presentation by community members?

.....
.....
.....
.....
.....

3. What have you not enjoyed in this lesson?

.....
.....
.....
.....
.....

4. How can the lesson be improved?

.....
.....
.....

.....
.....
.....

Appendix I: Focus Group Interviews (Sharing Circles)

Title

Mediating of learning of nutrition through traditional food processing and preservation to Grade 6 rural school learners.

EXPLAIN

CODE:

RED: USING OF VISUAL AIDS IN TEACHING SCIENCE

PINK: SENSE- MAKING

YELLOW: USE OF EASILY ACCESSIBLE CULTURAL TOOLS

BLUE: SOCIAL INTERACTION

GREEN: INTEGRATION OF IK

BRIGHT GREEN: PARTICIPANTS VIEWS ON HOW SCIENCE SHOULD BE TAUGHT

1. Yintoni oyaziyo malunga nolwazi lwasekuhlaleni?

What do you understand by local knowledge?

Jola: Ndazi ukuba ukutya kungcinwa njani kutya kuhlale ixesha elide.

I know how to keep food **so that it lasts longer.**

Mamzangwa: Ndazi indlela zokungcina ukutya kwesintu esikutyayo nengoma zesintu.

I know the different ways of keeping food to last longer and **singing traditional songs**

Nyawuza: Mna ndazi izidlalo zesintu nengoma esiziculayo xa kukho umembulo I know cultural songs especially those we sing when we have cultural events.

Zulu: Ndazi ukuba ukutya kugcinwa njani kusetyenziswa izinto ezifumaneka ekuhlaleni.

I know how traditional food is preserved using **tools that are found from the community.**

2. Ungakhe undixelele ukuba izifundo zenzululwazi uzifunda njani apha esikolweni?

Can you tell me how do you learn science at school?

Mamzangwa: Apha esikolweni sifundiswa ukwenza iexperiment kwisifundo senzululwazi.

At school we learnt **how to do experiments in science lessons.**

Jola: Siyafunda ngokuthi sihambe siyokwenza uphando sibuye nalo sixoxe ngalo singabafundi.

We learn science by going out and find the information on the lesson that we are doing and as a class we debate around the topic.

Nyawuza: Ndifunda ukwenza uphando ngoku phangaleleyo sifake nolwazi esiza nalo emakhaya.

I learn how to do research and connect the information from home or community with what was learnt in class.

Zulu: Ndifunda ukwenza uphando malunga nescience sihambe siyofunda emakhaya indlela zokugcina ukutya kusetyenziswa ulwazi lwamandulo zingekabikho ifridge.

I learn how to do investigations about how food was preserved by our ancestors before the invention of refrigerators.

3. Zixulumana njani izifundo zenzululwazi nolwazi olufumana emakhaya okanye ekuhlaleni?

What relevance does local knowledge from your home or community have at school?

Zulu: Lusineda ukuba sikwazi ukudibanisa into esiyifunde apha emakhaya siyidibanise nesiyifunda apha esikolweni ngoba izinto ezifundwayo emakhaya ziyathethwa zingaxiniswa umzekelo; ekhaya sifundiswa indlela zokupheka xa sipheka singadlulisi.

This knowledge helps us to connect what we learn from home with what is taught in class. For example, at home we are taught that we must not overcook food. Then at school, in science we are taught that when we over cook food it loses its nutrients.

Mamzangwa: Emakhaya sifundiswa ukuba masitye imifuno sizokuba namandla sihlale sisempilweni ngoba imifuno kutya ukunesondlo.

At home we are taught that we need to eat leafy vegetables because they are nutritious and will keep us healthy and at school we are taught that if we do not eat leafy vegetables we would suffer from deficiency diseases.

Jola: Ulwazi esilufumana esikolweni lwandiswa lulwazi esiza nalo emakhaya.

Our prior knowledge enhances what we are taught at school.

Nyawuza: I-Science esiza nayo esikolweni yandisa ulwazi kwizinto esihleli sizasi qha singazi ukuba yiscience ifike esikolweni yandiswe emakhaya kuyathethwa ngendlela zokugcina ukutya esikolweni zidibaniswe nendlela zangoku side sizenze sizokwazi ukuzikhumbula size nezinto ekakhaya.

Knowledge that we bring from home increases our science knowledge. For example; at home we know that we need to keep foods for later use. At school we learn different ways of processing and preserving food using both traditional and modern ways. The practical activities also enhance our understanding of science.

4. Ingaba izifundo zenzululwazi zinxulumana njani nolwazi oza nalo esikolweni?

How is your knowledge from home related to science taught at school?

Mamzangwa: Ziyafana ngoba emakhaya akugxilwa kakhulu xa sifundiswa sifundiselwa ukuba sizazi izinto ukuba zenziwa njani kanti esikolweni kuba namagama amatsha esiwafundiswayo xa sele siwajonga sifumanise ukuba athetha into enye qha ohluke ngendlela achazwa ngayo.

Science learnt at school is related to our knowledge from home in that at home we are taught how to do things but when we get to school we find that these things are given science terms.

Jola : Esikolweni sifundiswa indlela zokugcina ukutya kudityaniswa indlela zala maxesha nezakudala. Kanti emakhaya kusasetyenziswa zombini indlela ngoba emakhaya inyama ibekwa esithebeni ikhutshwe emhluzini ingazukhawuleza ibole.

At school we are taught **how to preserve food using both traditional** and modern ways, at home they use traditional ways for example the meat is put **on the grass mat after taking it out of the gravy** to avoid it from being spoilt.

Zulu: Ziyaxibelelana ngoba kaloku sihambe sayofuna ulwazi emakhaya saza nalo epha esikolweni saphinda saya kamakhulu siyofuna olunye lwazi. Xa lufika apha esikolweni saludibanisa nolu size nalo. Umakhulu wayesibonisa indlela zokugcina ukutya ukuze kungonakali esibonisa nemifuno ayilimileyo enceda ihigh blood pressure.

They are related because **we realised that after we visited the grandmother who presented to us the traditional method of food preservation,** some concepts learnt in class **emerged** from the presentation. For example, she demonstrated to us on how to keep food so that it lasts longer and showed us some of the leafy vegetables that help to control high blood pressure.

5. Ingaba indlela zokugcina ukutya zinxulumana njani nendlela yethu yokuphila emakhaya emva kwentetho kamakhulu notatomkhulu.

In what ways are science concepts of preserving and processing relevant to your everyday life after the presentation by the indigenous knowledge custodians?

Mamzangwa: Ndifumanise ukuba indlela yokugcina ukutya ziyafana zohluka kwindlela ababe kugcina ngayo ukutya ngoba imifino yayityiwa kudala nangoku isatyiwa kodwa sifumanise ukuba le mifuno inezakha mzimba iyakwedlula ukutya esikutyayo ngoku.

I learnt that the traditional ways of processing food and modern ways are still used, for example the leafy vegetables were eaten and we are still eating them. What I have learnt was that **leafy vegetables are nutritious and healthy for our bodies.**

Jola: Sifunde ukuba indlela yokugcina ukutya iyafana kwezinye indawo nesetyenziswa ngokwala maxesha. Eyakudala yona ndifumanise ukuba ixesha eli ninzi ukutya kwakuphekwa, kugutywe kojiwe kanti ngoku kufakwa efridgini kuzohlala ixesha elide.

I learnt that the methods of keeping food to last longer are the same but differ because in the olden days most of the time **they cooked, grind and do smoking** to keep food to last for a longer time. The modern ways **used freezing and pickling to** keep food to last longer.

Nyawuza: Into endiyifundileyo yeyokuba indlela zokuguqula ukutya kuhlale ixesha elide kuyafana nendlela zakudala ngoba ngexesha lasentwasa hlobo kutyiwa umbona, siyawupheka, senze isophu sitye namaceba. Nakudala kwakutyiwa ngolo hlobo umahluko ibe ngowokuba ngoku sifaka nebhotolo emboneni.

I learnt that the methods of preparing and keeping food to last for a longer time are the same because in autumn we are still eating the corn in different ways such as **cooking, grinding**. The only thing that is different now is that other people add margarine when they eat cooked corn.

6. Ungakhe undixelele ukuba ubufuna ifundiswe njani isifundo sesidlo.

Can you tell me how the topic of nutrition “processing and preservation” can be taught.

Jola: Ukuba bekunothi xa sifundiswa kufakelwe izinto esizaziyo ezifana nevideo sibone izinto esizaziyo kungaba mnandi nathi sithathe inxaxheba.

If we can use examples that we **know from our homes** and the lesson can also make use of videos. Lastly, we need to take part in the lesson.

Mamzangwa: Bendingathanda xa sinodibanisa ulwazi esi lufumene emakhaya nolwazi lwasesikolweni apho sifundiswa amagama amatsha atsho andise ulwazi lwethu.

I would like to be **taught science by using both methods of processing and preserving food using traditional knowledge from home** because I learnt that both these methods are related but now we **ignore the traditional** method focusing on modern ways of processing and preserving food.

Zulu: Ukuba kungathi xa sifundiswa esi sihloko kubizwe umzali apha ekuhlaleni azosicacisela kuqala ukuba bona babesenza kanjani sidibanise ulwazi esilu fumana kumzali oceliwe nolwazi oluza kuthethwa ngutitshala singafunda ngcono. Sakugqiba size nezinto emakhaya eziza kubayinxenye yesifundo eso.

If, when we learn the topic of nutrition we could **invite the community member to do the presentation.** Then, after the presentation the teacher teaches us the lesson **integrating the knowledge** we got from the community member to increase our level of understanding. Also if we could also **bring concrete objects for the experiment** and do **practical activities**.

Nyawuza: Singafunda ngcono xa sinokwenza ipractical activity, siyokwenza.

We can learn better by doing practical activities.

7. Yintoni enye obunqwenela ukuba singayifaka xa sifundisa izifundo zenzululwazi?

What else would you like to share with me regarding the integration of local knowledge in science?

Jola: Into endirhalela ukuba ifakwe yimifanekiso emalunga neso sisifundo. Sele ndibonile ukuba ulwazi lweze Nzululwazi luninzi kubazali bethu, ngase nabo bangamenywa bazokusifundisa basandisele ulwazi.

Another thing that I would like to see is the use of pictures that are relevant to

the topic. We can also

invite the community members because I have noticed that they are rich with knowledge and science that can help us understand of science learnt in class.

Mamzangwa: Ngase kungasetyenziswa ulwazi lwakudala ludityaniswe nescience esiyifundayo ngoku. it would be better if we can combine traditional and modern science to make science more interesting.

Nyawuza: Ukuba singababiza abazali basekuhlaleni ingakumbi aba sele bekhulile ngoba bona banolwazi oluphangaleleyo, ukuba singaphinde sisebenzise uvideo ukwenza umdla wokuba siyithande iscience.

It would be better if we can invite the elderly community members to do the presentation because I learnt that they are rich with knowledge and the knowledge they have can be integrated in science lessons. Also, if we can use videos that are relevant to the topic of nutrition.

Zulu: Ukuba singathi xa sifundiswa kusenyenziswe imizekelo yezinto esizaziyo. Kuphinde kumenywe umzali azosifundisa ngoku banzi ngeso sifundo ngoba kaloku bona banolwazi lwendlela ezazisetyenziswa ngayo. Ukusetyenziwa kwemifanekiso kungasanceda ngoba kaloku sizokwazi ukuthetha ngezinto esizibonayo.

Inviting the community members to do the presentation especially for the science lessons that are related to our indigenous knowledge. Also the use of pictures could also enhance our interest in science.

Appendix I: Journal Reflections: Colour-Coded

Questions	L1	L2	L3	L4	L5
1. What have you learned from this lesson?	I learnt that science we learn is more practical	I learnt different ways of preserving and processing food	I learnt that science is interesting when we are involved in practical activities	I learnt that preserved food is nutritious more than the food we eat	I learnt that science is connected with knowledge we that we already have
2. What have you enjoyed in the lesson?	Different ways of processing and preserving food	The link between modern and traditional science	To be hands-on the lesson	To work as a team and respect one's opinion	To see that food that is processed can stay longer
3. What have you not enjoyed?	Nothing	To learn that food that we eat can cause diseases	No comment	To learn that food can be stored underground in a pit	Everything was fine to me
4. How can the lesson be improved?	More practical activities to be done	By adding more resources that can be interesting	Posters that are related to the lesson	By using concrete objects	Lesson must be more practical
Questions	L6	L7	L8	L9	L10
1. What have learned from this lesson?	I learned how the food is processed and preserved.	Learned that science is alive and science is enjoyable, and it can be around us	I learned how the food is processed and preserved in the past	I learned about traditional practices of food processing and preserving	I learned about traditional food and how the food is processed and preserving

<p>2. What have you enjoyed in the lesson?</p>	<p>I have enjoyed to see that people in the past depended on that indigenous food</p>	<p>I have enjoyed to see that people in the past depended on that indigenous food</p>	<p>I have enjoyed to see that people in the past they depend on traditional indigenous food</p>	<p>I enjoyed that traditional science is more informative than western science because western science only shows us the examples. But in</p>	<p>To know more about traditional food</p>
				<p>traditional science we can go out and do the research</p>	
<p>3. What have you not enjoyed?</p>	<p>Is to see that the food that we eat is not healthy</p>	<p>What I did not like in this lesson is that the food we eat is not healthy and can make us sick</p>	<p>I did not like to stand in front of the class and do the presentation</p>	<p>I did not like to hear that the food that we eat is not healthy</p>	<p>To hear that the food we eat make us sick</p>
<p>4. How can the lesson be improved?</p>	<p>We need to be more involved when we do the practical activities and invite community for the presentation</p>	<p>We need to have posters in class so that we can see what we are talking about. And when we are writing exams they can remind us just to have the idea</p>	<p>It can be improved by inviting local indigenous knowledge to come and do the presentation especially to the relevant topic that can give us more knowledge</p>	<p>We can improve by inviting the people to come to school and tell more about traditional food</p>	<p>By using both western and traditional knowledge</p>