

**Mobilising *stories* about cultural beliefs and practices on
traditional foods to contextualise the topic on nutrition in a Grade
6 township class**

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By

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Declaration of Originality

I, Siphon Nimrod Nuntsu, declare that this thesis is my own original work that is submitted at Rhodes University and has not been submitted to any other university. All ideas and citations used in this study derived from other people are acknowledged and indicated in the reference list.

Signature:

A handwritten signature in black ink, appearing to be 'Siphon Nuntsu', written in a cursive style.

Date: 27 December 2020

Dedication

This thesis is dedicated to my late mother Sindiswa 'no-Amen' Nuntsu who passed away during the coronavirus pandemic and lockdown; my lovely wife Nobuhle Magingxa-Nuntsu and the late Adv Thembela Mbebe who all have supported me throughout the years and without them I would not have been able to complete my thesis.

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Abstract

The South African Curriculum Assessment and Policy Statement (CAPS) document stipulates that science teachers should integrate indigenous knowledge (IK) into their science teaching. The rationale for this is to contextualise the content and make science accessible and relevant to learners. Despite these ideals, however, CAPS seems to be silent on how science teachers should go about doing this. Instead, it assumes that all teachers know how to integrate IK in their science teaching. As a result, many teachers are still not sure of how to integrate IK into their science classrooms. Such rhetoric and tension between curriculum formulation and implementation triggered my interest to do a study on how to mobilise *stories* about cultural beliefs and practices of traditional foods to mediate learning of nutrition in a Grade 6 Natural Sciences township class.

The study was underpinned by an interpretivist paradigm complemented with an Ubuntu paradigm to enhance explanations. Within these paradigms, a qualitative case study research design was adopted. It was conducted at Mdoko Primary school (pseudonym) in a semi-urban community in the Amathole West district of the Eastern Cape. The participants were 34 Grade 6 learners (15 boys and 19 girls), a Grade 6 Natural Sciences teacher who was my critical friend, and two expert community members. To generate data, I used a focus group discussion, group activities, classroom observations, and learners' reflective journals. Vygotsky's socio-cultural theory and Ogunniyi's Contiguity Argumentation Theory (CAT) were used as theoretical and analytical frameworks, respectively. A thematic approach to data analysis was employed. That is, data were analysed inductively to identify sub-themes and subsequently similar sub-themes were grouped together to form themes.

The two expert community members' presentations equipped my learners with *stories* on cultural beliefs and practices that were used in the olden days (past) and how such *stories* are used in our days (present). For instance, the findings of this study revealed that women during menstruation must not drink *amasi* as it is believed that it would prolong the menstruation time. The findings also revealed that eating of *amaqanda* and inside meat by youths should be minimised as it is believed that it can stimulate their sex hormones. It also revealed that there is no relevance to science that men eating *imifino* would be weak among other men who do not eat them. The implications for this study is that science teachers should make some efforts to integrate IK in their teaching to make science accessible and relevant to their learners. To achieve this, the study thus recommends that science teachers should find ways of tapping into

the cultural heritage and wisdom that is possessed by the expert community members to enable learners to cross the bridge from home to school.

Keywords: Natural Sciences, nutrition, scientific knowledge, indigenous knowledge, storytelling, socio-cultural theory, argumentation, CAT

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List of Abbreviations and/or Acronyms

BEd:	Bachelor of Education
CAT:	Contiguity Argumentation Theory
CoP:	Community of Practice
DAIM:	Dialogical Argumentation Instructional Model
FGI:	Focus Group Interview
ILV's:	Indigenous Leafy Vegetables
IK:	Indigenous Knowledge
MEd:	Master's of Education
TMESD:	Transformative Model of Education for Sustainable Development
WS:	Westernised Science
ZPD:	Zone of Proximal Development

CHAPTER ONE: SITUATING THE STUDY

1.1 Introduction

The main goal of my study was to explore mobilisation of *stories*¹ about cultural beliefs and practices on traditional foods with a view to contextualising learning of the topic on nutrition in a Grade 6 Natural Sciences township² class. The study was triggered and motivated to ignite passion for learning science amongst township learners from under-resourced schools.

In this chapter, I therefore discuss the background of the study followed by statement of the problem. The rationale and the significance of my study is also provided and the research goal and questions that guided my study are also discussed.

1.2 Background of the Study

The Natural Sciences is a subject in the National Curriculum Statement (NCS) of 2011 that is taught from Grade R-9 (South Africa. Department of Education [DoE], 2011). It consists of the following main strands: Life and Living, Matter and Materials, Energy and Change, and The Planet Earth and Beyond. The Life and Living strand focuses on the Life Sciences component. Matter and Materials focuses on solids, gases, mixtures, and solutions. Energy and Change focuses on electric circuits, conductors, insulators, and main electricity. The Planet Earth and Beyond focuses on the solar system, movement of the earth and planets, the movement of the moon, and systems to explore the moon and Mars (Magwentshu, 2020).

Of the four strands, my study focused on the Life and Living strand. The emphasis for this strand is on nutrition, nutrients in food, food groups, different ecosystems, plants and food, food plants and air, food webs, balanced diets, and food processing (South Africa, DoE, 2011).

¹ Storytelling is used by indigenous people to pass on knowledge from generation to generation (Seehawer, 2018; Smith, 2012).

² The apartheid government in South Africa used the term 'township' to designate a geographical area set aside for Blacks only.

According to the South African science curriculum, the topic about nutrition and food groups should be taught in one-and-a-half-week period. Notably, the Grade 6 curriculum, which is the focus of this study, deals with nutrition in food as well as food groups. From my experience as a Natural Sciences teacher, I have found that some learners are bored when it comes to the topic of nutrition and yet this is relevant and applicable in their everyday lives (Kuhlana, 2011; Njume, Goduka & George, 2014; Ruxton, Derbyshire & Gibson, 2010). Metaj-Macula and Bytyqi-Damoni (2020) argue that prior knowledge in science can play a significant and active role in constructing new knowledge at school. Furthermore, consideration of learners' prior knowledge can stimulate motivation to learn science. In this regard, and on reflection, my assumption is that such boredom could be because of how I have been teaching this topic. I came to realise that it is important that what is learnt at home can also be applicable at school (Aikenhead & Jegede, 1999). It is against this background that in this study I explored mobilising *stories* about cultural beliefs and practices on traditional foods with a view to contextualising learning of the topic on nutrition.

Indeed, this is in line with what is advocated in the Curriculum Assessment and Policy Statement (CAPS) document that learners should demonstrate an understanding of the relationship between *science, technology, society* and *the environment* (South Africa, DoE, 2011). For instance, the CAPS document states in the Specific Aim 3, 'Science, Technology and Society', that there is a relationship between indigenous knowledge and different world views to accomplish understanding of connections between Science, Technology and Society (see Appendix K).

Moreover, central to this curriculum is the recognition of other ways of knowing and doing, such as local or indigenous knowledge (see Appendix L). In light of this, Aikenhead and Jegede (1999) point out that when the science culture is in accordance with learners' culture, science might be meaningful to them. A number of scholars also believe that this relationship between *science* and *society* might afford learners an opportunity to understand that science at school is actually relevant to their lives outside of the school (Mavuru & Ramnarain, 2017; Oluruntegbe & Ikpe, 2011). Expanding on Vygotsky's (1978) seminal work, Mavuru and Ramnarain (2020) reiterate that it is important for science teachers to take into consideration diverse learners' socio-cultural contexts in their science classrooms. That is, learners should be at the centre of learning whereby teachers assume the role of being facilitators and mediators of learning taking into consideration learners' local knowledge or indigenous knowledge. Local knowledge or

traditional knowledge or indigenous knowledge (IK) are used interchangeably in literature. However, in this thesis I will use local or indigenous knowledge (IK) throughout.

Notwithstanding, Hewson, Javu, and Holtman (2009) argue that it remains a challenge for some teachers who do not necessarily have a background in indigenous knowledge (IK) within South Africa to put these ideals into practice. As a result, those teachers may not be able to teach such science knowledge embedded in IK. In light of this, Mhakure and Otulaja (2017) caution that the successful implementation of the integration of IK and Westernised Science knowledge (WS) in the classroom will depend mostly on the knowledge of the teacher about these two worldviews. On a positive note, however, in a research conducted in Khayelitsha, Cape Town, it was revealed that most of the teachers indicated that they had no problem with integrating different worldviews (Hewson et al., 2009). The findings of this study also revealed that science teachers believe that they should work with traditional health practitioners (THP) collaboratively to help teach learners at all school levels. These scholars believe that will create a positive rapport between the school and the community to encourage integration of IK in school science.

It is recognised, however, that most IK is not recorded in the textbooks but instead has been communicated by word of mouth from generation to generation (Kibirige & Van Rooyen, 2006). In contrast, the school science is recorded and is assessed in the syllabus. In my view, these two worldviews should complement each other. For example, the pedagogy should integrate learners' worldviews in science lessons to make it easy for the learners to comprehend science. Mhakure and Otulaja (2017) refer to this as culturally sensitive pedagogy. Therefore, teachers would need to acknowledge that local or indigenous knowledge might also be equally powerful and meaningful to indigenous learners. It was hoped, therefore, that this study would help both the teachers and learners to illustrate whether IK is meaningful or not to learners. That would be manifested by the interest the learners show in science class as well as the learning outcomes if they are achieved or not.

1.3 My Personal Experience

I grew up in a small township in the Eastern Cape and also attended a primary school in that township. Local or indigenous knowledge was not part of my upbringing as I came from a Christian home that saw anything indigenous as secular (Jones & Whitehouse, 2017; Roland & Yang, 2017). There was a clash between Christianity and local or indigenous knowledge in

my time as a learner (Le Grange, 2007; Mesoudi, 2009; Seehawer, 2018). I also grew up in an extended family where I stayed with my parents, siblings, cousins, aunts, uncles, and grandmother. My grandmother was a general worker in one of the former model C schools and she used to bring us leftover food from work. We used to eat the leftovers for supper and some before we went to school. After school we used to play some township games such as soccer and golf as well as indigenous games. There was no television in my home and we used to watch television at our neighbours who were fortunate to have one and we paid 10 cents to watch for the day.

During my school years, most of the time we learnt through rote learning rather than learning with understanding, the concept, Tsai, Jessie, Liang, and Lin (2011) describe as '*memorisation*'. I came to school when they were using slates and there were no exercise books at that time. Slates were used to learn every subject and we had to clean it in between subjects and then were promoted to the next class if we succeeded at the end of the year. As I was so playful at school, I ended up repeating Standard 4 (Grade 6) and I learnt my lesson after that as I did not repeat another class. In those years at school the traditional method of teaching was used where learners were not given the opportunity to ask questions as we were spoonfed. My favourite subject at school was geography but in Standard 8 (Grade 10) I started doing Physical Sciences until I exited secondary school.

As a teacher I have taught Mathematics and Natural Sciences from 1996 to date. For many years, I taught science without integrating local or indigenous knowledge as it was not catered for in the South African curriculum and I just followed what was in the textbooks. I valued indigenous ways of knowing that I learnt in my community but did not know how to integrate these two worldviews in my class. My enrolment at Rhodes University for Bachelor of Education (BEd) started to change things as I gradually started integrating local or IK in my science lessons and the border crossing started (Aikenhead & Jegede, 1999; Orell & Philaju, 2020). The greatest opportunity came in 2015 when a Norwegian researcher came to Grahamstown (*Makhanda*) and conducted an IK project in our schools. The project helped me to plan model lessons with my colleagues and that triggered my interest in furthering my education in IK related studies. During the implementation of the exemplar lessons, we found that learners actively participated in the lessons (Sedlacek & Sedova, 2017).

From that day on I never turned back and in 2018 I enrolled for Master's in Education (MEd) with Rhodes University. After consultation with Prof. Kenneth Ngcoza, I decided to choose

science and do a study on IK. I met caring and motivating supervisors as well as a great community of practice (CoP) where, as colleagues we shared everything that would develop us academically and professionally. The expert community members as the custodians of indigenous knowledges that I invited to my classes have also developed me in my professional journey. Until now the team I just mentioned kept me moving forward and I since adopted a slogan “backward never and forward ever”. I have decided to take local or indigenous knowledge studies to the PhD level and will collaborate with colleagues locally, on the continent and internationally in publishing some articles. I am currently teaching science in three grades namely Grade 5, 6 and 7 and integrating local or indigenous knowledge in science with a belief that they must co-exist (Ogunniyi & Hewson, 2008). I decided to do a study about cultural beliefs and practices of traditional foods in a Grade 6 township class to mediate the topic of nutrition.

1.4 Statement of the Problem

The South African CAPS curriculum requires science teachers to integrate local or indigenous knowledge in their classrooms. However, the challenge is that there are no clear guidelines on how to go about implementing or enacting this. As a result, it seems teachers are using their discretion which results in different interpretations depending on their understanding of the different worldviews. That is, there is a tension between curriculum formulation and implementation.

As alluded to earlier, I also noticed boredom among the learners in the topic on nutrition in particular. This uncertainty and gap in the curriculum prompted me to conduct this study, the focus of which is on exploring mobilising *stories* about cultural beliefs and practices on traditional foods to mediate learning of the topic of nutrition in a Grade 6 township class. I now discuss the rationale and significance of this study.

1.5 Rationale and Significance of my Study

As alluded to earlier, in 2015 I was involved in local or Indigenous knowledge project coordinated by a researcher from Norway who was doing her PhD project at Grahamstown primary and secondary schools. During this project we met once a week and collaboratively developed and planned some model lessons that integrated local or IK into our science classrooms. The researcher subsequently visited our classrooms to do some observations on

how we mediated learning of the model lessons. During the implementation of the model lessons we found that learners actively participated in the lessons (Diwu & Ogunniyi, 2012; Sedlacek & Sedova, 2017).

My involvement in that project thus triggered my interest to do a similar research on how to integrate local or indigenous knowledge into my Natural Sciences lessons, focusing specifically on mobilising stories about cultural beliefs and practices from the community on traditional foods with a view to mediate the learning of nutrition in a Grade 6 township class. Drawing on Aikenhead and Jegede's (1999) seminal work, I believe that the *stories* about cultural beliefs and practices on traditional foods might make my science lessons relevant and hence enable my learners to cross the border between home/community to school science. In the context of this study, border crossing refers to making what is taught at school in a science classroom relevant to what learners already know from home.

1.6 Research Goal and Research Questions

The main goal of my study was to explore mobilisation of stories about cultural beliefs and practices on traditional foods to contextualise the learning of nutrition in a Grade 6 Natural Sciences township class.

To achieve this goal, the following research questions were addressed:

1. What kind of stories about cultural beliefs and practices on traditional foods such as ³*amasi*, *imifino*, *amaqanda* and *inyama* do Grade 6 learners know from their homes and the community?
2. How do the Grade 6 learners interact, argue, participate and learn (or not) during the presentations by the expert community members on stories about cultural beliefs and practices on traditional foods such as *amasi*, *imifino*, *amaqanda* and *inyama*?
3. How do Grade 6 learners' conceptions, dispositions and interest shift/evolve (or not) as a result of the presentations by the expert community members on stories about cultural beliefs and practices on traditional foods such as *amasi*, *imifino*, *amaqanda* and *inyama*?

³ *Amasi* is sour milk, *imifino* is made from wild leafy vegetables, *amaqanda* is eggs and *inyama* is meat.

1.7 Theoretical and Analytical Frameworks

This study is informed by Vygotsky's (1978) socio-cultural theory. In his seminal work, Vygotsky (1978) suggests that learning is a cultural process in which social interactions play a vital role. Language as a cultural tool for communication is also significant during social interactions. Such interactions could be between the learners and the teacher as well as among learners themselves, where there is the more knowledgeable other who helps those learners who are struggling. Furthermore, learning is a complex process with some contradictions and tensions, in my case between indigenous knowledge and what is learned at school.

Vygotsky's (1978) socio-cultural theory was complemented with Ogunniyi's (2007a) Contiguity Argumentation Theory (CAT) as an analytical framework. Ogunniyi (2007a) accentuates that argumentation happens when two different cultures co-exist, that is, local or Indigenous knowledge and science, and can only be possible through cognitive shifts to accommodate each other. The five CAT categories describe the movement of conceptions in the mind of a learner. That means that these categories might help me understand what my science learners think about the integration of Indigenous knowledge (IK) in science lessons in the topic of nutrition in particular. These components were employed in this study to analyse ideas that emerged during social interaction (Vygotsky, 1978). These two theories are dealt with in detail in Chapter Two of this thesis.

1.8 Definition of Key Concepts

Attitude: In this study, attitude refers to learners' negative or positive beliefs (Mavuru & Ramnarain, 2017) towards the integration of local or indigenous knowledge in science lessons.

Conceptions: General views learners possess about science and the integration of local or indigenous knowledge (Attalah, Bryant & Dada, 2010).

Culture: The set of attitudes, values, and beliefs shared by a group of people that is acknowledged universally (Awoniyi, 2015).

Dispositions: A habitual tendency to act in a certain way when opportunity presents itself (Graven, 2012).

Indigenous Knowledge: A legacy of knowledge and skills that are unique to a society (Kibirige & Van Rooyen, 2006).

Interest: Frequently used in daily conversation that includes curiosity, enjoyment, and motivation (Swarat, Ortony, & Ravelle, 2012).

Multicultural: Means inclusion for all types of people against segregation (Tonbulogu et al., 2006).

Social interaction: How we act and react to people around us (Vygotsky, 1978).

1.9 Thesis Outline

The study was conducted at Mdoko Primary School [pseudonym], a township school in the Amathole West Education district of the Eastern Cape. It consists of the following six chapters:

Chapter One: This chapter provided the background of the study and highlighted the reasons for carrying out the study. The statement of the problem was explained, such as the uncertainty and the gap of the curriculum between curriculum formulation and implementation. In addition, the rationale and the significance of my study was explained in relation to stories about cultural beliefs and practices about traditional foods to enable my learners to cross the bridge between home and school. The theoretical and analytical frameworks informing my study were briefly discussed. Lastly, the research goal and research questions that guided the study were provided.

Chapter Two: This chapter reviews the literature that is relevant and pertinent to the study. Nutrition is also discussed as the Curriculum and Assessment Policy Statement (CAPS) requires teachers to teach about nutrition and a balanced diet. The literature brings some light to the topic of indigenous knowledge and teaching in multicultural classrooms. Literature around the learners' attitudes toward the integration of local or Indigenous knowledge in teaching science is discussed in this chapter. In addition, literature around conceptual, theoretical, and analytical frameworks are also discussed in this chapter.

Chapter Three: The research methodology and research design underpinning this study are discussed in this chapter. I also discuss the two methodological frameworks, namely, Contiguity Argumentative Theory (CAT) and the Dialogical Argumentative Instructional Model (DAIM) used in this study. In addition, the research site where the study was conducted as well as the sampling of participants, such as learners, expert community members, and the teacher who was a critical friend are provided. My positionality in the study is also highlighted.

Lastly, the research design, methodology, and the data gathering techniques such as focus group interviews, group activities, observations, and journal reflections and the rationale behind their use are discussed. Lastly, the ethical considerations such as, validity, reliability, and trustworthiness are presented.

Chapter Four: Data presentation, analysis, and discussion on how Grade 6 learners interacted, argued, participated, and learnt (or not) during presentations by expert community members on *stories* about cultural beliefs and practices on traditional foods is provided. The summary of qualitative data generated during the group activity is discussed. Learners' newsprints on *amasi*, *inyama*, *amaqanda* and *imifino* are presented. Additionally, the summary of the qualitative data generated during the group activity is discussed.

Chapter Five: Data presentation, analysis, and discussion about Grade 6 learners' conceptions, dispositions, and interest shift (or not) as a result of presentations by the expert community members on stories about cultural beliefs and practices about traditional foods like *amasi*, *imifino*, *amaqanda* and *inyama* are discussed. In addition, I used Ogunniyi's analytical framework called Contiguity Argumentative Theory (CAT) and the Dialogical Argumentative Instructional Model (DAIM) to analyse the data generated from learner presentations in class about *amasi*, *imifino*, *amaqanda* and *inyama*, focus group interviews and learners' journal reflections.

Chapter Six: This chapter gives an overview and summarises the main findings of the study from all three research questions. It also presents some recommendations and limitations of the study and areas for further research are discussed. The study also provides the summary of my personal reflections through this learning journey. I wrap up the chapter with a conclusion.

1.10 Chapter Summary

The chapter starts by giving the background of the study. The literature from different scholars in conjunction with the South African curriculum called CAPS were discussed and that provided the need to, and significance of carrying out this study. The statement of the problem and the rationale of my study were discussed with literature relevant to the study. Lastly, the chapter was concluded by the research goal and research questions for the study. In the next chapter, I discuss literature relevant to the study.

CHAPTER TWO: LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

The aim of this study was to mobilise *stories* on cultural beliefs and practices about traditional foods in my Grade 6 township class. It was triggered by the need to contextualise and make science relevant to my learners. In the previous chapter I discussed the context of my study.

In this chapter, I thus discuss literature relevant to my study, namely, the topic on nutrition in the Grade 6 syllabus, what is indigenous knowledge, literature around cultural beliefs about food such as sour milk (*amasi*), traditional leafy vegetables (*imifino*), meat (*inyama*), and eggs (*amaqanda*) and how these are prepared by different communities. Lastly, I discuss some literature around teaching in multicultural classrooms.

2.2 Nutrition

The Curriculum Assessment and Policy Statement (CAPS) (2011) document recommends that teachers of Grade 6 for Natural Sciences and Technology should teach nutrition and a balanced diet about food that we eat every day. CAPS describes that most food processing is done in factories, but some happen through indigenous practices. That has paved a way for me to look at food that is processed through indigenous practises notably those used in my learners' local communities. An example is the production of *amasi*, a South African fermented milk product (Osvik et al., 2013; Zepro, 2015). According to Osvik et al. (2013), *amasi* is a historically important product in many South African cultures, and cattle-owning families in rural areas still produce and consume it. It is believed that *amasi* is highly nutritious. Agyei, Owusu-Kwarteng, Akabanda, and Akomea-Frempong (2020) explain that during the fermentation of milk, the proteolytic and metabolic activity of the lactic acid bacteria lead to changes in the nutritive characteristics of milk due to the release of free amino acids (Ekebas-Turedi, Uk, Basfirnci & Pinar, 2020; Pessione & Cirrincione, 2016).

Additionally, Gaucheron (2011) indicates that fermented milk is a source of micronutrients particularly calcium, as well as other elements such as phosphorus, magnesium, zinc, and selenium. Due to the high content of calcium in the milk, Agyei et al. (2020) explain that milk is vital for the development of bones in children and in the prevention of osteoporosis in elderly people. Another quality of fermented milk is that it possesses biological active compounds that protect neonates and adults from pathogens (Park & Nam, 2015). Having discussed the nutritional content as well as the importance of the various nutrients in milk, another traditional food explored in this study are leafy traditional vegetables.

It is recognised that children who lack adequate nutrition are unable to concentrate and participate fully in the learning process (Krivasonoka, 2017). This can be addressed through the establishment of backyard gardens where vegetables previously considered wild vegetables can be cultivated (Bvenura, Anthony, & Afolayan, 2015; Khader, 2016; Taleni & Goduka, 2013; Kutu & Magongwa, 2017). Bvenura et al. (2015) explain that such vegetables are common and important sources of food and nutrition in the rural areas where they can be harvested from backyard gardens, animal houses, or agricultural fields. For instance, commonly cultivated leafy vegetable species are *cleome gynandra* (*muruthu*, in Venda) (Maanda & Bhat, 2010), *amaranthus hybridus* (*unomdlomboyi*, in Xhosa and *imbuya*, in Zulu) (Bvenura & Afolayan, 2014), *bidens pilosa* (*umhlabangubo* in Xhosa, *amalenjane*, in Zulu) (Bvenura & Afolayan, 2014); *amaranthus cruentus* (*unomdlomboyi* in Xhosa, and *Imbuya* in Zulu (Maanda & Bhat, 2010).

The consumption of these leafy vegetables potentially reduces food insecurity in South Africa as they are rich in nutrients. For instance, *umhlabangubo* is rich in protein, fibre, copper, and magnesium. Bvenura et al. (2015) explain that due to the presence of these minerals in these traditional leafy vegetables, they can combat diseases that result from mineral deficiencies. For instance, *unomdlomboyi* is rich in rutin, as a result it provides protection against atherosclerosis, osteoarthritis, haemorrhoids, and strokes. They further stress that beyond their favourable nutritional composition, these vegetables are a free commodity, as they can be gathered from agricultural fields, and swampy areas. Moreover, these vegetables are drought, disease, and pest resistant which puts them on the advantage side for cultivation (Bvenura et al., 2015). Still on the topic of locally found traditional food, it is also documented that eggs are rich in essential nutrients.

Abadi et al. (2018) provide that eggs are rich in nutrients such as protein, fat, vitamins, and minerals. They indicate that protein in particular is an excellent food for growth of children. In addition, he suggests that nutrition education should encourage the consumption of healthy and nutritious diets year-round. In light of this, parents should be encouraged to prepare food with adequate nutrition, especially traditional foods, for learners to be able to perform at school. Khader (2016) suggests that people are to be encouraged to have backyard gardens that will help them prepare nutritious food.

Rao (2016) corroborates that parents should consider that there are nutrition problems that include not only undernutrition, but also obesity. That suggests that they should give their learners' balanced diets to avoid nutritional problems. In my case, the knowledge about nutrition is transferred by parents to their children and is communicated from generation to generation as highlighted by Kibirige and Van Rooyen (2006) Such knowledge could be in the form of local or indigenous knowledge. In conclusion, Manorama (2016) suggests that food cannot be viewed just like a commodity it is a basic need just like oxygen we breathe. That confirms that food as a basic human need is so important in our lives and our learners should cognisance of that.

2.3 What is Indigenous knowledge (IK)?

Kibirige and Van Rooyen (2006) define Indigenous knowledge as a legacy of knowledge and skills that are unique to a society. Notably, such knowledge and skills constitute wisdom that is passed on orally from generation to generation (Iseke, 2013; Leape, Shore, Dienstag, Mayer & Healy, 2012; Otulaja & Ogunniyi, 2017). A wide range of literature suggests a need for integration of IK into the science curriculum (Aikenhead & Jegede, 1999; Mukwambo, Ngcoza, & Chikunda, 2014). In the context of my study, learners were afforded an opportunity to find information from their homes and community on stories about cultural beliefs and practices on various traditional foods. This was intended to close the gap between what is learnt at school and at home.

In light of this, Aikenhead and Jegede (1999) suggest that IK can be used as a bridge between home and school science. They refer to this phenomenon as border crossing. Agreeing are Kibirige and Van Rooyen (2006), who believe that learners might enjoy the process of linking what they have informally learnt at home and what they are taught at school. For example, learners are exposed in their homes or communities to wild leafy vegetables (*imifino*) which

from a cultural point of view are only eaten by women. In contrast, the school science is about the different food groups and their health benefits in the Grade 6 science syllabus. My assumption, therefore, was that since learners are used to seeing their mothers eating and enjoying *imifino*, they might be able then to argue and answer questions in class about the value of minerals and vitamins that are in them. By doing so, learning would have taken place.

It is against this caveat that some scholars suggest that science taught in schools should be meaningful and should take into consideration what the learners already know from their homes (Kuhlane, 2011). In support of this, Mavuru and Ramnarain (2017) emphasise the importance of considering learners' socio-cultural background. This suggests that the school curriculum should consider what learners already know at home in order to link that with school science. It is recognised, however, that, teachers themselves should be able to cross cultural borders to be able to integrate both these worldviews in their lessons.

Similarly, Moyo and Kizito (2014) and Ogunniyi (1988) affirm that the integration of local or Indigenous knowledge into the science classroom is a merger of these two worldviews that appear to be in conflict. Concurring, scholars such as Mukwambo et al. (2014) and Seehawer (2018) indicate that integration of IK should therefore be understood as a prerequisite to decolonise and Africanise education. As far as these scholars are concerned, this is necessary since our education system was colonised and westernised rendering it alien to most learners. To make integration of local or Indigenous knowledge possible, therefore, we need to decolonise and Africanise our education system for the benefit of the indigenous people (Bredlid, 2009). In the context of my study, I integrated IK and westernised science through mobilising stories about cultural beliefs and practices on traditional foods.

Regarding traditional foods, Cimi (2009) highlights that some of these leafy wild vegetables (*imifino*) have nutritional value that some parents do not realise. Agreeing, Kaya (2014) posits that the staple food items like leafy wild vegetables and meat in the African diet were obtained from wild food resources. Extending on this proposition, Kasiime, Ochieng, Kessy, Karanja, Rommney, and Afari-Sefa (2018) add that indigenous vegetables are nutrient-dense and address both mineral deficiencies and hunger. For example, these scholars highlight that the African eggplant⁴ is rich in micronutrients such as iron and vitamin A. Admittedly, it seems

⁴ An eggplant is a plant that belongs to the Solanaceae family (*umthuma*) where some are edible and can be used for medicinal purposes and some not edible – eggplant is edible.

that the community might not automatically be aware of the rich traditional sources of nutrition. This led me to the point that not all men believe in the consumption of wild vegetables.

In their study conducted in Limpopo and KwaZulu-Natal, Faber, Oelofse, Van Jaarsveld, Wenhold, and Janse van Rensburg (2010) found that some men were stereotyped and believed that by consuming wild vegetables (*imifino*) they would be weak among men. These scholars believe that by doing so they are forfeiting the nutritional value that comes from eating wild vegetables (*imifino*). In light of this, Faber et al. (2010) believe that understanding of traditional foods in multicultural communities might pave the way for understanding the mediation of learning in multicultural classrooms. However, not all African people have traditional African knowledge and there are some negative stereotypes about some traditional foods, for example, those that believe that leafy wild vegetables (*imifino*) should not be eaten by men. Here, African people refers to indigenous people of Africa. One possible way in which IK can be communicated is through stories.

2.3.1 Stories

Morgan and Dennehy (1997) maintain that “stories are a powerful means of communicating values, ideas and norms, and make information easier to remember” (p. 495). Drawing on Morgan and Dennehy’s (1997) seminal work, Keane, Khupe, and Muza (2016) propose that a researcher should begin with their own story before they understand the stories of others. In addition, these scholars illustrate that storytelling makes us different from animals. Building on Kibirige and Van Rooyen’s seminal work, Wyeld, Leavy, Carrol, Gibbons, Ledwich, and Hills (2007) posit that stories are a means by which knowledge is passed from generation to generation. Furthermore, scholars such as Smith (2012) and Seehawer (2018) aver that storytelling reflects the orality of many African cultures and is a way of transmitting knowledge. In the context of my study, such stories were specifically about cultural beliefs and practices on traditional foods with a view to inform and enable mediation of learning of nutrition.

Iseke (2013, p.559) accentuates that “storytelling provides opportunities to express the experiences of indigenous people in indigenous languages and sharing of indigenous knowledge and culture”. In concurrence, Tzou et al. (2019) accentuate that indigenous storytelling does not relate only to cultural teachings but also to the theories about the natural world. In my case, for instance, I sent my learners to research stories about cultural beliefs and

practices on traditional foods in their homes and community. Thereafter, learners were required to come to class and discuss those stories in groups.

In light of this, Iseke (2013) argues that stories should be educational and aid us in attending to the past and reconsidering our future. Concurring, Keane et al. (2016) drawing on Gargiulo (2006) outline that stories can contribute to learning. Furthermore, Tzou et al. (2019) posit that stories inspire people in a holistic sense with interrelatedness of the intellectual, emotional, and physical spheres. Additionally, Tzou et al. (2019) suggest that stories are vessels for passing along teachings from generation to generation. These scholars thus believe that the stories can assist in remediating historically powered paradigms between IK and western knowledge systems. In the context of this study, I therefore encouraged my learners to link local or indigenous knowledge to how people can live in the future (Chikamori, Tanimura, & Ueno, 2019).

However, there are counter arguments in relation to the role of stories in learning. For instance, Van Gils (2005) critiques storytelling highlighting that the focus might shift from education to entertainment. In contrast, I believe that entertainment can overcome boredom during science lessons. Notwithstanding, stories might be distorted in the process of being passed on from generation to generation (Mesoudi, 2009; Msimanga & Lelliot, 2014; Roland & Yang, 2017). Mesoudi (2009) reminds us that culture is not static but it evolves. Agreeing, Roland and Yang (2017) argue that cultural evolution impacts on cultural beliefs. This led me to explore the value of culture in the class and community.

2.3.2 Culture

Vygotsky (1978) suggests that language is a cultural tool that is related to the development of the mind. Culture is basically a man-made environment that is a system of artefacts (Chilisa & Ntseane, 2010; Toomela, 2008). Furthermore, Vygotsky suggests that children develop in the cultural environment of their parents, meaning that a child receives their first cultural education from their parents. In concurrence, Whiten, Hinde, Laland, and Stringer (2011) argue that children inherit culture from their parents through social learning. That suggests that learners come to school with a rich culture from home.

Fischer (2009) posits that culture is a collective practice that is shared among members of a particular group. To Awoniyi (2015), culture is a concept that is acknowledged universally and its relevance differs from society to society. Notably, however, our cultural heritage is not

written in textbooks but it is transmitted orally from one generation to the next. Additionally, Awoniyi (2015) further posits that culture embraces religious beliefs, languages, style of living, and all other aspects of life.

That suggests that learners in the context of my study might not interpret ideas in the same way because they come from different cultural backgrounds such as black and coloured communities. It is acknowledged, however, that even families from the same cultural background can interpret the cultural practices in different ways. That is why in *isiXhosa* there is a proverb which says “*imizi ayifani, ifana ngeentlanti zodwa*” (homes are not the same but they are similar in relation to their kraals only). Meaning that all learners in my class are expected to respect and honour the culture of other learners. It is believed that culture can have either a negative or positive contribution to the multicultural classrooms.

2.3.3 Teaching in multicultural classrooms

Okoye-Johnson (2011) maintains that multicultural education challenges and rejects racism and all types of discrimination in schools and accepts and affirms pluralism. Relatedly, multicultural classrooms and their education are seen as a school reform activity that aims at providing standard education that is inclusive for all learners. Furthermore, it might develop empathy when recognising many cultures to increase academic success for our learners (Galczynski, Tsagkaraki & Gosh, 2011; Mavuru & Ramnarain, 2020; Mhakure & Otulaja, 2017; Tonbulogu, Aslan, & Aydin, 2016). Such education is inclusive for all learners and as such is against any form of segregation.

That is, all learners from different backgrounds are given equal opportunities to prosper at school against all odds. Toomela (2008) avers that all cultures are at the same level of development and yet different depending on the particular history of that culture. Agreeing, Dahal (2018) argues that cultural variations influence children’s ability to learn. Furthermore, this scholar suggests that interaction with people and the environment promotes children’s cognitive and linguistic capability. In the context of this study, learners had different cultural backgrounds and this was evidenced by the way they argued their viewpoints. This suggests that diversity is a strength rather than a shortcoming.

It should be acknowledged, therefore, that learners in a multicultural classroom have rich cultural capital from their homes (Banks, 1995). Drawing from the seminal work of Banks (1995) that learners have rich cultural capital, N’Dri Konan, Chatard, Selimbegovic, and

Mugny (2010) report that in a study conducted in European educational institutions, cultural diversity had a positive effect on performance. Agreeing, Dahal (2018) proffers that learners' cultural experiences at home are the foundation for their future learning as reiterated by Chikamori et al. (2019). That suggests that science teachers should capitalise and build on that foundation for meaningful learning to take place. Literature points to the importance of learner attitudes towards integration of IK in science classrooms.

2.4 Learners' Attitudes Towards Integration of IK in Teaching Science

Some learners' attitudes and interest in what is taught in the classroom is associated with their socio-cultural setting (Gilbert, 2010; Mateus & Ngozo, 2019; Mavuru & Ramnarain, 2017). However, some opposing views were depicted by research conducted in Malaysia by Waldrip and Taylor (1999), which showed that the majority of learners were not impressed with the idea of a traditional worldview. They argued that it is only good for their parents and that they did not want to be associated with IK. Agreeing with Waldrip and Taylor (Hodson, 2009; Horsthemke and Schafer, 2007) reject the idea of ownership of knowledge along indigenous and ethnic divisions. Furthermore, they argue that the term indigenous knowledge has been used uncritically by politicians to further their agendas.

Scholars such as Cobern and Loving (2001) and Hodson (2009) too, warn that we should be careful to accord equal status to science and IK as this might lead to the latter being disadvantaged. In contrast to Horsthemke and Schafer (2007) however, these scholars are for plurality of knowledges. Some proponents of IK such as Keane et al., (2016), Mhakure and Otulaja (2017), Mukwambo et al. (2014), Seehawer (2018) and Ogunniyi (2007a) also caution against romanticising indigenous knowledge. Similarly, Mukwambo et al. (2014); Martin, Steward, Watson, Silva, Teisina, Matapo, and Mika (2020) advise that indigenous views cannot be homogenised or generalised. Instead, any misconceptions that come with local or indigenous knowledge should be identified and corrected.

2.5 Concepts

In this study, I used the following concepts: conceptions, dispositions, and interest. I now discuss each of these below

2.5.1 Conceptions

Atallah, Bryant, and Dada (2010) maintain that conceptions are views and ideas that learners have about a subject, for example, nutrition in the context of my study. According to Chan (2011), conceptions refer to understanding of knowledge and change in personal views through learning. Concurring, Tsai, Jessie Ho, Liang, and Lin (2011) state that conceptions of learning increase knowledge and can be utilised in practice. Chiou, Lee, and Tsai (2013) believe that learners' conceptions are built from their actual experiences of learning. These conceptions can indeed increase knowledge especially for cultural beliefs and practices about food. Furthermore, these scholars accentuate that conceptions reflect a better understanding of connectedness between learning environments and learners' learning. Chan (2011) argues that learners' conceptions are studied by qualitative means like interviews with learners and reflective writings. Tsai (2011) argues that conception variations may contribute to different cultural or educational contexts. However, Asikainen, Virtanen, Parpala, and Yläne (2013) bemoan the fact that studies on learners' conceptions of learning are scarce in science. It is against this caveat that it was hoped in this study that *stories* about cultural beliefs and practices on traditional foods would play a vital role in influencing my learners' conceptions.

Moreover, Xu, Ritzhaupt, Umapathy, Ning, and Tsai (2020) aver that conceptions of learning are concerned with how a learner understands learning and how they make sense of learning through their experiences. In light of this, it was hoped that in this study IK about traditional foods from the community might enable my learners to make sense of nutrition when they argue and discuss about this topic in class. That is, learners were seen as central in the learning process. However, Mavuru and Ramnarain (2020) caution that teachers of a particular cultural group may feel conflicted when engaging with learners. Furthermore, these scholars argue that those discussions may challenge learners' conceptions that are culturally and gender based.

For instance, a study conducted by Chen and Brown (2018) in China revealed that female learners had more positive outlooks than male learners' conceptions of assessment. In addition, these scholars revealed that female learners showed stronger interrelations between their learning strategies and conceptions. That was also revealed in this study as female learners seemed to show more interest in the focus group interview than male learners. It seems that this might be related to doing household activities by boys and girls. That resonates with a study conducted in Nigeria that found there is an opportunity for learners to master chemistry concepts when they do household chores (Olurentegbe & Ikpe, 2011). In conclusion, Lonka,

Ketonen, and Vermunt (2020) posit that conceptions should also involve collaborative aspects of learning. It should also recognise that learners' conceptions are related to their dispositions.

2.5.2 Dispositions

Atallah, Bryant, and Dada (2010) accentuate that dispositions are the beliefs that are exhibited by the frequent and conscious behaviour directed to learning. These scholars further argue that dispositions can go beyond motivation and cognitive roles that can be triggered by curiosity. Agreeing, Driscoll and Wells (2012) posit that dispositions can determine how intellectual traits like knowledge and skills are applied. For example, one can be inherently good at maths and it is believed that others without those internal traits might not be good in maths. This means that you could get your maths ability from one of your parents; furthermore, she argues that dispositions can be influenced by external factors such as classroom practice. Agreeing, Crick and Goldspink (2014) suggest that dispositions can be maintained in and through learners' engagement with their environment. The learners' environment in the context of this study is a classroom as well as community. Leong (2017) suggests that there are no common lists of dispositions as they differ according to culture within the community. In addition, she argues that all people in the world are born unique. I kept on praising my learners when they were trying to perform in class, which I had hoped would increase their positive dispositions. The positive dispositions can be modelled by young children and preservice teachers if they are around people who exhibit them (Govender, Mudaly & James, 2016; Leong, 2017).

Atallah et al. (2010) further describe learners' positive dispositions as tendencies to act and think positively. These scholars maintain that dispositions are ongoing tendencies that guide intellectual behaviours and can be good or bad, productive or counter-productive. That means that the teacher's role is important in guiding and molding the learners' good and productive dispositions.

According to Graven (2012), a disposition is a habitual tendency to act in a certain way when opportunity presents itself. Concurring, Anwer, Iqbal, and Harrison (2012) posit that positive dispositions have an impact on the performance of learners as evidenced in Agunbiade, Ngozoa, Jahawar, and Sewry's (2017) study conducted in South Africa. These scholars maintain that some researchers agree that developing a positive disposition is significant for success in learning. In addition, they point out that some scholars use dispositions and attitude interchangeably.

In this study, I have opted to use disposition throughout my thesis. I also adapted Atallah et al.'s (2010) criteria to understand learners' conceptions and dispositions towards science. These scholars agree that both negative and positive attitudes can influence learning. Agunbiade et al. (2017) aver that developing a positive disposition is significant for success and achievement in learning. In this study, I explored whether or not there was a shift in learners' dispositions when integrating local or indigenous knowledge in teaching about cultural beliefs and practices about food. Expanding on Tzou et al.'s (2019) seminal work, I mobilised stories to achieve this.

Other scholars argue that attitudes and dispositions are integrated to define one's behaviour (Atallah et al., 2010). Nonetheless, Graven and Heyd-Metzuyanim (2014) caution that not all dispositions are relevant to learning power. Furthermore, Agunbiade (2015) posits that attitudes and dispositions can be used interchangeably as both these reveal one's mind-set in a particular context. In agreement, Twissell (2019) avers that dispositions are important features in support of the strategies used to solve problems. I was interested to see what my learners' dispositions would be about learning what was taught in class if it related to their socio-cultural settings (Mavuru & Ramnarain, 2017; Ngcoza & Southwood, 2015). In conclusion, Leong (2017) accentuates that the learners' positive dispositions that emerged from her study ensured they had a growth mindset that helped them get further in life. It should also be acknowledged that conceptions and positive dispositions could contribute to learners' interest during science lessons.

2.5.3 Interest

Korsun (2017) posits that the interest of learners is the basis for the formation of motivation to learn. Scholars such as Biney (2015) and Daskalovska, Gudeva, and Ivanovska (2012) accentuate that interest-based study is linked to motivation and to an enhanced positive impact on learning in the short and long term. In addition, Daskalovska et al. (2012) argue that another way of increasing learners' motivation and interest in learning is to use interesting topics. Likewise, learner interest can be significant to a learner's academic development. Agreeing, Swarat, Ortony, and Revelle (2012) maintain that interest is frequently used in daily conversation that includes *curiosity*, *enjoyment* and *motivation*. Furthermore, these scholars aver that learners who have interest in a certain topic can work together and support each other. Concurring, Korsun (2017) suggests that an interest can be caused by dispositional interest as

well as situational interest. In addition, he further confirms that every teacher will have to use different methods for the development of interest in learning.

Daskalovska et al. (2012) posit that learners' interest is the basis for the formation of motivation to learn. These scholars suggest that cognitive interest consists of summaries and explanative illustrations while emotional interest promotes effective arousal in the reader. In addition, they suggest that teachers should promote cognitive interest to help learners to activate their appropriate prior knowledge. That is, there is an intimate relationship between motivation and interest and I have witnessed, that when learners receive positive motivation from the teacher they develop an interest in learning. This finding has affinity to Biney's (2015) assertion that highly motivated learners are eager and show interest in attending classes.

In the context of this study, the prior everyday knowledge such as stories about cultural beliefs and practices about traditional foods from home were important in enabling learners to interact and argue in class (Langenhoven & Stone, 2013; Ogunniyi, 2015; Webb, 2013). Since some learners might not value, to stimulate interest in them in this study I encouraged them to find stories about cultural beliefs and practices on traditional foods from their homes and communities.

2.6 Theoretical and Analytical Frameworks

Vygotsky's (1978) socio-cultural theory informed my study. Central to the socio-cultural theory is that learners learn in social contexts. I also used Ogunniyi's (2007a) Contiguity Argumentative Theory (CAT) as an analytical framework. I now discuss each of these theories below.

2.6.1 Theoretical framework: Socio-cultural theory

Vygotsky's (1978) socio-cultural theory illustrates that learning is the link between social interactions and human development. In addition, Vygotsky believes that social interactions play a vital role in children's learning. In consequence, the culture of the child, the teacher, and the whole education system have an impact in this process. Such interactions could be between the learner and the teacher as well as the learners themselves, where there is the more knowledgeable other who helps those learners who are struggling (Lunde, Irene-Hauge & Sagbakken, 2020; Stott, 2016).

Furthermore, Vygotsky (1978) points out that everything in the child's development is learned twice, first through social interactions with others and later through individual mental structures. He further posits that "human learning presupposes a specific social nature and a process by which children grow into the intellectual life of those around them" (p. 88).

Concurring, Sedlacek and Sedova (2017) believe that learners' active participation takes place in a social context – in my case, in the classroom and in the community. Put differently, learners learn best when they interact with each other as well as with the teacher and community members (Klein, 2011). Accordingly, in my study I also involved community members who are perceived as custodians of the cultural heritage of traditional foods in particular. For learning to take place in this study, I thus mobilised stories about cultural beliefs and practices on traditional foods in the community. For these reasons, the socio-cultural theory was thus deemed appropriate in my study as it explains how learning takes place in a socio-cultural context (Das & Singh, 2014; Mavuru & Ramnarain, 2020; Zapata-Calle, 2016).

Within this theory, however, I focused on the following concepts: *mediation of learning*, *social interactions* and the *Zone of Proximal Development*. Vygotsky (1978) posits that mediation of learning introduces the use of cultural tools to attain goals and make learning worthwhile. Through mediation of learning using language as a cultural tool, a teacher can clarify some challenging concepts the learner should learn, which agrees with Nhase's (2019) study conducted in South Africa, where she found that language (in her case, isiXhosa, a main language in the Eastern Cape) is a cultural tool. Vygotsky (1978) also describes language as both a cultural and a psychological tool. As alluded to earlier and similar to Klein's (2011) study conducted in Namibia, in this study I invited two ⁵expert community members who are knowledgeable (Vygotsky, 1978) about cultural beliefs and practices on traditional foods. Thereafter, I used such knowledge or cultural heritage to mediate learning of nutrition in my classroom.

Learners were afforded an opportunity to interact socially and share with other learners from different backgrounds, stories about cultural beliefs and practices about traditional foods. I had hoped that the social interactions would make it possible for active participation (Sedlacek &

⁵ These community members are referred to as experts since they are custodians of the cultural heritage and according to Vygotsky (1978) are knowledgeable others.

Sedova, 2017) and hence meaningful learning to take place. Such social interactions might ultimately have an influence on learners' zone of proximal development.

According to Vygotsky (1978), the zone of proximal development is the distance between the actual development levels that are determined through independent problem solving; all this happens under guidance of the teacher as well as the collaboration with more capable people (teachers, parents, and learners) called more knowledgeable others. Vygotsky elegantly makes the point that the level of development is accomplished when the children interact with others in a classroom.

However, Stott (2016) argues that there is an assumption that it is only the learner who benefits in the zone of proximal development, and further says that all participants benefit, namely learners and adults. For instance, in this study the expert community members were pleased that their expertise and their knowledge about cultural beliefs and practices were recognised and have a potential to be used in class. Furthermore, they were willing to share their cultural knowledge in any platform in the future. Stott (2016) resonates well with Goos, Galbraith, and Renshaw (2002) who maintain that in a research conducted using ZPD in maths teacher education, the ZPD was created for adult students.

2.6.2 Analytical framework: Contiguity Argumentative Theory

In this study, I used the Contiguity Argumentative Theory (CAT) as my analytical framework. Ogunniyi (2007a) accentuates that the contiguity argumentation theory (CAT) happens when two different cultures co-exist and can only be possible through cognitive shifts to accommodate each other. In addition, he maintains that argumentation has been used as a rhetorical and instructional tool in many different societies. The five CAT categories describe the movement of conceptions in the mind of a learner (see Table 2.1). That means that these categories might help me understand what my science learners think about the integration of IK in science lessons in the topic of nutrition in particular.

Table 2.1: Contiguity cognitive states of the Contiguity Argumentation Theory (CAT)

Categories	Cognitive states
Dominant	A powerful idea explains and predicts facts and events effectively and convincingly or resonates with an acceptable social norm that affords an individual a sense of identity e.g. a scientific explanation of lightning in terms of static electricity as opposed to the explanation proffered for the same phenomenon within an indigenous worldview.
Suppressed	An idea becomes suppressed in the face of more valid, predictive, empirically testable evidence, or established social norms e.g. the scientific explanation of the cause of a disease may be suppressed in the face of cultural beliefs about possible diabolical motives of enemies behind the disease.
Assimilatory	A less powerful idea might be assimilated into a more powerful one in terms of the persuasiveness or adaptability of the dominant idea to a given context e.g. the indigenous idea of not leaning against a metal pole, tree or wall which may have arisen from experience can easily be assimilated into the scientific concept of lightning as an electrical phenomenon.
Emergent	There may be circumstances where no prior idea exists and a new one has to be acquired or developed e.g. a considerable amount of scientific concepts such as atoms, molecules, magnetism, conservation of matter, laws of motion, etc. have usually been learnt from school science.
Equipollent	When two competing ideas have comparably equal intellectual force, the ideas tend to co-exist without necessarily resulting in a conflict e.g. the theory of evolution versus creationism.

Source: Ogunniyi (2002), Ogunniyi and Hewson (2008) (adapted from Langenhoven & Stone, 2013, p. 4)

The five components of CAT are described as: dominant – a powerful idea that explains and predicts facts and events effectively; suppressed – an idea becomes suppressed in the face of more valid evidence; assimilated – less powerful idea might be consumed into more powerful ones by persuasiveness of the dominant idea to a given context; emergent – there may be circumstances where no prior knowledge exists and the new knowledge has to be acquired or developed and lastly, equipollent – when two competing ideas have equal intellectual force (Govender, 2014; Mayana, 2020; Ogunniyi & Hewson, 2008). These components were employed in this study to analyse ideas that emerged during social interaction (Vygotsky, 1978). Now I discuss briefly how indigenous knowledge and westernised science should complement each other.

In their integrationist model, Taylor and Cameron (2016) argue that westernised science and indigenous knowledge systems should be considered as complementary rather than being mutually exclusive. Concurring, Ngcoza (2019) argues that such a ‘third space’ is a bridging process that operates between the scientific knowledge and IK practices. That means that we need to utilise that neutral ground also known as the ‘third space’. Furthermore, in such a ‘third space’ indigenous practices might stimulate arguments amongst the participants (Diwu & Ogunniyi, 2012; Sannino, Engeström, & Lemos, 2016).

Moyo and Kizito (2014) maintain that argumentation is strongly promoted as a significant teaching approach in science as it provides evidence about knowledge claims, whether they are scientific or indigenous in nature. These scholars further point out that the ability to argue skilfully is important to validate or refute knowledge claims that emerge when science and IK meet (Aydeniz & Ozdilek, 2015; Moyo & Kizito, 2014; Ogunniyi & Hewson, 2008). It seems that these scholars believe that these arguments are based on facts rather than ‘myths’ (Chakona & Shackleton, 2019; Graziani, Guidetti, & Cavazza, 2020; Ramasubramanian, Winfield, & Rieswestahl, 2020).

Ogunniyi (1988) avers that learners might have two contrasting explanations of the same natural phenomenon such as school science and IK. Agreeing are Aydeniz and Ozdilek (2015), who argue that learning science through argumentation might assist learners in developing an improved understanding of the nature of science. Moreover, Ghebru and Ogunniyi (2017) indicate that argumentation and argumentation instruction help to promote a teacher’s ability to generate classroom discussions. In my case, since I was teaching in a multicultural classroom, it was hoped that learners might come with different stories about cultural beliefs

and practices on traditional foods and opposing ideas about different diets. For example, some might not see any problem with eating pork while others might argue why pork is prohibited by their religious beliefs. It was anticipated that such diverse views from learners and expert community members would foster argumentation amongst my learners.

A study conducted in Namibia revealed that parents and community members play a pivotal role as they share their cultural heritage with their children so that the information is not lost (Anthony-Stevens, Mahfouz, & Bisbee, 2020; Klein, 2011). Similarly, Ghebru and Ogunniyi (2017) indicate that earlier studies were conducted in socio-cultural environments where learners were empowered to share ideas with their parents and teachers.

Govender (2014) reminds us that African learners are taught science and other subjects in westernised classrooms without the cultural and indigenous experiences. He thus suggests that the combination of debates, the teachers' background knowledge, and IK has a strong impact on learners' change of status regarding science and IK. Other scholars such as Mhakure and Otulaja (2017) agree with Govender, that there is a need to integrate westernised science and IK. That triggered my interest to use Ogunniyi's Contiguity Argumentation Theory (CAT).

In sum, these two theories complement each other; for example, CAT was employed in this study to analyse ideas that emerged during social interactions as suggested by Vygotsky (1978). I believed that would help me to understand learners' inputs during social interactions in group work, expert community members' presentations, and what they reflected on in their journals. Ogunniyi (2007a) avers that CAT is contextually based, meaning that it can be used in both of these frameworks. That is why the socio-cultural theory and CAT were relevant theoretical and analytical frameworks for this study.

2.7 Chapter Summary

In this chapter, I discussed the literature that informed this study. I started the chapter by discussing nutrition and the value of a balanced diet. I defined the concept of indigenous knowledge and its significance in my study in particular nutrition, stories, and culture. The conceptual framework about learners' conceptions, dispositions, and interest towards the integration of IK in teaching science was discussed. Lastly, I discussed the theoretical and analytical frameworks informing this study. In the next chapter, I discuss the research methodology employed in this study.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

In the previous chapter, I discussed the literature relevant to this study and in relation to the integration local or indigenous knowledge (IK) in science lessons. I further discussed teaching in multicultural classrooms that provide standards for *inclusivity* for learners irrespective of their socio-cultural background. The learner attitudes towards integration of IK in teaching science were discussed.

In this chapter, I discuss the methodology underpinning this study whose main goal was stories on cultural beliefs and practices about traditional foods to contextualise the learning of nutrition in a Grade 6 Natural Sciences township class. To achieve this goal, the following research questions were addressed:

1. What kind of stories about cultural beliefs and practices on traditional foods such as *amasi*, *imifino*, *amaqanda* and *inyama* do Grade 6 learners know from their homes and the community?
2. How do the Grade 6 learners interact, argue, participate and learn (or not) during the presentations by the expert community members on stories about cultural beliefs and practices on traditional foods such as *amasi*, *imifino*, *amaqanda* and *inyama*?
3. How do Grade 6 learners' conceptions, dispositions and interest shift/evolve (or not) as a result of the presentations by the expert community members on stories about cultural beliefs and practices on traditional foods such as *amasi*, *imifino*, *amaqanda* and *inyama*?

I start by discussing the paradigms underpinning this study followed with the research design employed.

3.2 Interpretive and Ubuntu Paradigms

Wahyuni (2012) points out that the strongest view about the interpretive study is that both the researcher and participants influence the collection of data and analysis. Similar views are shared by Thomas (2013) who accentuates that the key to interpretivism is to make sense of how people make sense of the world. In light of these arguments, my study was underpinned by an interpretive paradigm, the focus of which is on understanding human agency, behaviour, and attitudes (Bertram & Christiansen, 2015). These scholars posit that in the interpretive paradigm the data is generated in real authentic situations and that ultimately leads to descriptions of behaviours, perceptions, and experiences. In the context of this study, I observed the behaviour of my learners during the group discussions. This study also afforded me an opportunity to observe how my learners interacted with expert community members who willingly shared their knowledge and expertise on cultural beliefs and practices about traditional foods.

However, one of the limitations of the interpretive paradigm is that it focuses on descriptions at the expense of explanations. As an attempt to address this limitation, I therefore augmented the interpretive paradigm with the Ubuntu paradigm. Makabela (2015) accentuates that the foundation of Ubuntu should be used to underpin African research activities and it seems for an African research to be relevant it should be embedded on the Ubuntu paradigm. Furthermore, she suggests that the Ubuntu approach should improve Afrocentric research. Lastly, Makabela (2015) posits that this paradigm focuses on the indigenous African culture for the study of African behaviour. Concurring, Seehawer (2018) posits that the Ubuntu paradigm presents ethics of how to interact with others and in the context of my case study, learners and expert community members. Makabela (2015) professes that researchers should show respect for indigenous communities including respect for individuals. She further suggests that the Ubuntu paradigm teaches us about the privacy and confidentiality of the research participants. Concurring, Seehawer (2018) posits that there should be mutual respect between the researcher and the researched during social interactions.

In the context of this study, social interactions as proposed by Vygotsky (1978) afforded me an opportunity to explore how the knowledge from the cultural beliefs and practices about food was acquired. This approach was appropriate for my study as it was hoped that it would enable me to get some explanation and understanding of learners' conceptions, dispositions, and

interests when stories about cultural beliefs and practices about traditional foods were integrated into my science lessons.

3.3 Research Design

Bertram and Christiansen (2015) point out that the research design is a plan of how the researcher collects and analyses data systematically to answer the research questions. Within the interpretive and Ubuntu paradigms, a qualitative case study research design was adopted in this study.

3.3.1 Qualitative case study research design

Creswell (2008) defines a case study as a comprehensive investigation of a confined system. It also provides a researcher with a deeper understanding of the dynamics of a situation (Bertram & Christiansen, 2015; Cohen, Manion, & Morrison, 2018; Maree, 2014). Extending on Creswell's (2008) seminal work, Bertram and Christiansen (2015) aver that a case study allows deeper exploration and provides a full and thorough understanding of particular lived experiences of participants.

My case in this study was a Grade 6 Natural Sciences class from a township school in the Amathole West District of the Eastern Cape in South Africa. One of the characteristics of case studies is that they are bounded (Cohen et al., 2018). For instance, 34 Grade 6 learners, two expert community members, and a critical friend who is a Natural Sciences teacher at my school were involved in my case study. There was a limited amount of time to gather data and hence I only focused on the Life and Living strand which deals with food. Essentially, my focus was on stories about cultural beliefs and practices about traditional foods such as *amasi*, *inyama*, *amaqanda* and *imifino*. My unit of analysis was the learners' conceptions, dispositions, and interest towards science. My other unit of analysis were the social interactions during the presentations by the expert community members.

Merriam and Tisdell (2009) aver that the advantage of qualitative studies is that the researcher can expand their own understanding through both verbal and non-verbal communication. That is why I opted for the qualitative study as it helped me expand my knowledge about learners' conceptions, dispositions, and interest about the integration of local or indigenous knowledge (IK) in science lessons, in particular nutrition. This study also looked at how the presentations made assisted the learners to gain understanding of cultural beliefs and practices about food in

the semi-rural context where this study was conducted. To achieve this, some scholars support the value of active learning during science lessons (Sannino et al., 2016; Schudel, 2012). Schudel (2012) maintains that there is interest in active learning in South Africa as well as globally. Actually, one of the principles that underpins our Curriculum and Assessment Policy Statement (CAPS) document is active learning that seeks to move away from rote and uncritical learning, “that will allow learners to work effectively as individuals and with others as the members of the group” (DOE, 2011, p. 5).

I thus see active learning as trying to encourage teachers to move away from traditional approaches that are teacher-centred to active learning which is learner-centred (Nyambe & Wilmot, 2012). To promote active learning in this study, a participatory approach was adopted. According to Bourke (2009), participation is better for the research to be genuine. In agreement, Seehawer (2018) suggests that all participants should participate to the fullest in a research but some might choose to participate minimally. In the context of the study, I invited all the participants to participate fully as I also participated and was able to ask some questions as a co-learner myself.

The participatory approach in this study was harnessed using Ogunniyi’s (2007a) Dialogical Argumentation Instructional Model (DAIM).

3.3.2 Methodological Framework: Dialogical Argumentation Instructional Model

The Dialogical Argumentative Instructional Model (DAIM) was proposed as a means for negotiating science and IK and it aims at reaching a consensus if possible (Diwu & Ogunniyi, 2012). Meaning, that the consensus must be reached in class that both of these worldviews should stay together and not compete but complement each other. It was hoped that after the consensus had been reached the learners might acknowledge that science is embedded in cultural practices. Similar to his Contiguity Argumentative Theory (CAT), Ogunniyi (2007a) maintains that DAIM takes the position that these two worldviews should be equal before the real integration takes place. That is, the playing fields should be leveled so that the integration can take place. He believes that might make learners participate and benefit from these two perspectives (Diwu & Ogunniyi, 2012). I am, however, mindful of one of the limitations of DAIM that some of the learners do not learn to argue constructively without help from the teacher (Simonneaux, 2000).

Both of these worldviews need to be valued as equal and the purpose of them co-existing should be that they complement each other. Concurring, Mavuru and Ramnarain (2020) argue that the learners' socio-cultural backgrounds should be considered when teaching science so that learning can be meaningful and relevant to learners. In addition, these scholars argue that recently there is evidence that DAIM has the potential to assist learners to navigate between their alternative conceptions and those of scientific conceptions. DAIM also allowed my learners to participate and engage in arguments and they were able ask some questions, something that is unusual from learners in township schools in general.

In Diwu's (2010) study, for instance, learners who were exposed to DAIM tended to develop both better attitudes to science and appreciation for the value of the science embedded in Indigenous Knowledge Systems (IKS). In this study, it was hoped that exposure to DAIM might benefit my learners and contribute to a shift in their attitudes regarding the integration of local or indigenous knowledge in science lessons and to be accommodative of other's ideas. By being accommodative, I mean they would be open to new information and ideas from other learners as well as expert community members. In addition, Diwu (2010) argues that learners who are exposed to DAIM develop skills beyond recall and conceptual understanding. Concurring, February (2016) points out that DAIM is a useful and effective model to teach an integrated IKS science curriculum for the benefit of the learners.

In this regard, Langenhoven and Stone (2013) posit that the effective instruction creates an atmosphere where ideas may be raised and contradicted by the evidence and arguments of others. These scholars argue that in order for the learners to reach optimum levels of critical thinking they must apply dialogical arguments in reaching decisions. To achieve this they formulated the following stages: 1. group activity, 2. presentations by expert community members, 3. consolidation lessons, 4. reflection journals, 5. focus group interviews and 6. conversations with the two expert community members.

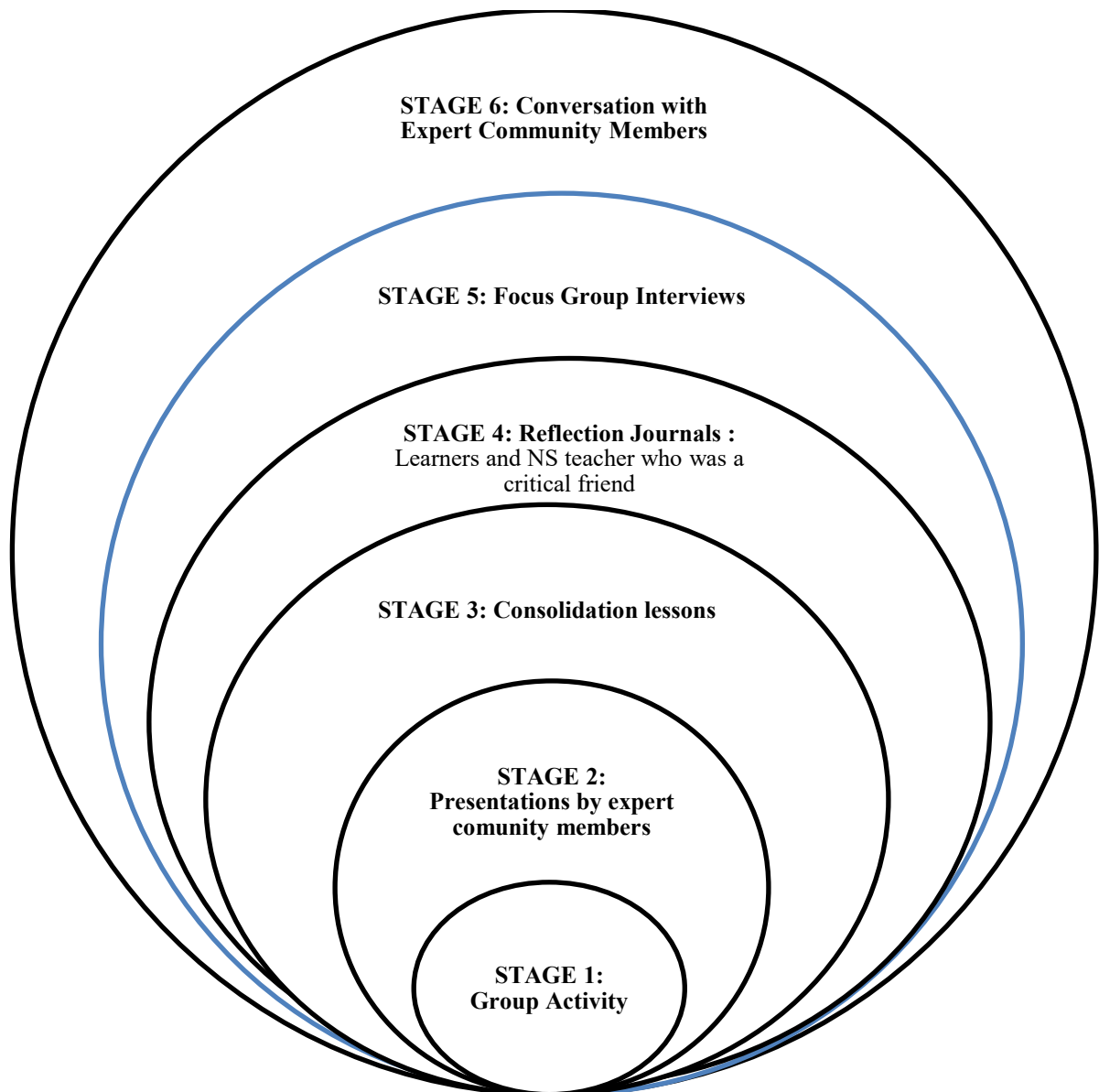


Figure 3.1: Shows the dialogical Argumentation Instructional Model (DAIM) (adapted from Langenhoven & Stone, 2013, p. 5)

In contrast to Langenhoven and Stone’s (2013) model, for Stage 1 (group activity), learners had to work in groups to find (research) stories about cultural beliefs and practices on traditional foods such as *amasi*, *amaqanda*, *imifino* and *inyama* from their homes and community. That is, agency was given to my learners (Sannino, Engeström, & Lemos, 2016). Stage 2 (presentations by expert community members and participant observation): Here I invited two expert community members to present some stories about cultural beliefs and practices about *amasi*, *amaqanda*, *imifino* and *inyama*. Stage 3 (consolidation lessons): I consolidated the lesson and focused on the science concepts in nutrition that emerged from the

presentations by the expert community members. Stage 4 (reflection journals): These reflective journals were from learners and the Natural Sciences teacher who was my critical friend. These journals were intended to establish how the Grade 6 learners' conceptions, dispositions, and interest towards science shifted /evolved (or not) as a result of the presentations by the expert community members' on stories about cultural beliefs and practices on traditional foods. Stage 5 (focus group interviews): These interviews were used to establish the learners' conceptions, dispositions, and interest towards science after the intervention. Stage 6 (conversation with expert community members): Consistent with the Ubuntu paradigm (Seehawer, 2018), I went back to the expert community members to ascertain how they felt about presenting to my learners. They reflected that they were pleased to go to school and present to learners even though they were not educated to do so. Furthermore, afterwards, they commented that they were impressed how my learners participated and argued during their presentations.

In this regard, Ogunniyi (2015) accentuates that DAIM promotes argumentation starting from individual (intra-argumentation), followed by small groups (inter-argumentation), and finally the whole group (trans-argumentation) where at the end collaborative consensus is reached. Likewise, I used DAIM in this study to focus on the social interactions amongst the learners (Vygotsky, 1978) and with the expert community members in order for them to reach consensus through argumentation.

3.3.3 Research site and sampling

The study was conducted at ⁶Mdoko Primary School [pseudonym] in the Amatole West District of the Eastern Cape in South Africa (see Figure 3.1). The Amathole West District is one of the districts in the new Service Delivery Model (SDM). It amalgamated the former district of Fort Beaufort and part of former King William's Town. The school has an enrolment of about 320 learners and nine teachers with a teacher-learner ratio of 1:36. It has old infrastructure with a few prefab classrooms and accommodates Grade R to 7 learners. Similarly to Mavuru and Ramnarain's (2017) study, the learners come from diverse socio-cultural backgrounds, such as black and coloured townships, as well as surrounding farms. Also, these learners mostly come from poverty-stricken families who depend only on social grants, while others come from a

⁶ Consistent with the focus of my study, the pseudonym [Mdoko] given to this school is an example of a fermented traditional non-alcoholic beverage called *amarhewu* made from maize meal.

middle-income group. As a result, this school is classified as a ⁷quintile 5 school and therefore learners do not pay school fees.

Convenient and purposive sampling was used in this study (Bertram & Christiansen, 2015). The school was convenient because it is where I am a school principal and a Natural Sciences teacher. I had hoped that this would make interacting with my research participants easier as I already work with them.

Drawing on the work of Bertram and Christiansen (2015), a Grade 6 class was purposively selected in this study as I teach them. Additionally, the topic on nutrition is part of the syllabus in this grade. Likewise, the Natural Sciences teacher and two expert community members were purposively selected as they were deemed suitable as they were willing to share their cultural heritage (Creswell, 2015). For instance, the teacher was experienced and had more than 15 years teaching Natural Sciences and Technology in Grade 6 classes. On the other hand, the expert community members were practising and more knowledgeable about cultural beliefs and practices as they grew up in rural areas. This placed them in a more knowledgeable position regarding local or indigenous knowledge as espoused by Vygotsky (1978). The sample size for this study was small as the aim of the study was not to generalise the findings to a larger population such as Grade 6 learners of the Amathole West Education District.

⁷ The quintile system in South African schools is about ranking of schools and learners due to socio-economic backgrounds. Quintile 1 is the 'poorest' whilst quintile 5 is the 'least poor' (Nhase, 2019).



Figure 3.2: The map of the Eastern Cape with Amathole District where the study occurs (Wikimedia.org/Wikipedia)

3.3.1.1 Learners

The class consisted of 34 learners, 15 boys and 19 girls. All learners participated voluntarily in this study. Cimi (2009) posits that learners must not be seen as passive but as purposeful and responsible for their own learning. Additionally, and similarly to Shetunyenga's (2019) study conducted in Namibia and Mayana's (2020) conducted in South Africa, I also invited two community members who are according to Vygotsky (1978), more knowledgeable about stories about cultural beliefs and practices on traditional foods, to come to class and share their funds of knowledge with my learners.

Firstly, however, learners were given guided questions to gather data from their homes and community about the cultural practices and beliefs about traditional foods such as *amasi*, *imifino*, *amaqanda*, *nenyama*. The main aim was to get the qualitative data that was aimed at ascertaining the conceptions, dispositions, and interest about the integration of local or indigenous knowledge in science lessons. The group activity was used for collecting data by dividing the learners into groups of six to discuss and argue cultural beliefs and practices about

amasi, imifino, amaqanda nenyama. The rationale behind this activity was to create a relaxed and non-threatening environment since these learners were minors. The study was affected by Covid-19. For example, it negatively impacted school nutrition programmes and our school could no longer provide meals for learners from low-income families (Mwambari, 2020; Nicola et al., 2020). However, I managed to gather most of my data once we came back to school after lockdown. There were challenges with physical distancing as the group discussion needed people to be close together. The other essential participants in this study were expert community members.

3.3.1.2 Two expert community members: Profile of participants

Table 3.1: Profile of the expert community members

Pseudonym	Age	Gender	Highest Standard	Home Language	Place of Birth	Other Languages	Role
<i>Nokwakha</i> (<i>MamCirha</i>) (Community member 1)	75	Female	4	IsiXhosa	Cofimvaba	English, Afrikaans	Pensioner (Former SGB member)
<i>Nomalanga</i> (<i>MamMfene</i>) (Community member 2)	67	Female	6	IsiXhosa	Cathcart	English, IsiZulu	Pensioner (Former SGB member)

In Table 4.4 above, I presented the profile of the two expert community members who gave presentations at school – they gave themselves the following pseudonyms, for community member 1: *Nokwakha* and community member 2: *Nomalanga*. The meaning of their pseudonyms is explained (see Section 3.3.3). *Nokwakha* and *Nomalanga* are both married to men from the *Tshawe* and *Zikhali* clans, respectively. In our African culture we show respect and yet level the ground by using clan names. Even my supervisors are *Gxarha* and *Mamntande* and I sometimes call them by their clan names instead of Professor and Doctor, respectively. They also call me *Jola* instead of Siphso. I feel so humbled by this relationship with my

supervisors. The expert community members' pseudonyms are used throughout the thesis. The background of the two expert community members indicates some similarities and some differences between them, for example, regarding where they were born and their level of education.

The two community members involved in this study came from the community around the school and nearby farm communities. I believed that while they came from the same community, they might have different traditional and religious beliefs from their forefathers. For the purposes of this study, I had initially invited three expert community members, two females to present about cultural beliefs and practices about *amaqanda* and *amasi* and one male to present about *imifino* and *inyama*. I chose women to talk about *amaqanda* and *amasi* for the reason that it is the women who are prohibited to eat *amaqanda* and *amasi* because of cultural beliefs. Moreover, it is the elderly women who are given the role to educate the young women on why they should not eat *amaqanda* and *amasi*.

On the other hand, men seem to know the different types of *inyama* and who must eat a particular *inyama* to honour certain cultural beliefs. In addition, men are not allowed to eat *imifino* due to cultural beliefs. It was deemed necessary to have different genders in my study for women to represent other women on how they feel when their cultural beliefs prohibit them from eating *amaqanda* and *amasi*. I decided to use a man to see how they felt when their culture prohibits them from eating *imifino* even though they are nutritious. My main focus was to establish which would come first – cultural beliefs or the health of a particular man. They all agreed to honour the invitation but unfortunately on the eleventh hour, the male member had a family commitment on the agreed date and so could not come for his presentation.

The presentations were conducted in *IsiXhosa* because all learners could understand it as they were mostly *IsiXhosa* first language speakers. For the few coloured learners, *IsiXhosa* was a first additional language and they were able to understand everything presented to them. In my case, *IsiXhosa* was used to communicate between my learners and expert community members. It shows the power of language as a cultural tool for communication (Hewson, Javu, & Holtman, 2009; Mavuru & Ramnarain, 2017; Nhase, 2019; Vygotsky, 1978).

I ended up having two female expert community members. Nokwakha whose ⁸clan name was MamCirha presented on the first day and Nomalanga whose clan name was Mamfene presented on the second day. When I asked them what their individual pseudonyms meant, Nokwakha explained that it meant building the family and community, while Nomalanga explained that it meant sunshine of the family.

I found both the pseudonyms significant and consistent with my study as Nokwakha was building on what was taught by the ancestors to conserve cultural beliefs and practices. On the other hand, Nomalanga was also significant as bringing and maintaining the sunshine and the light of our cultural beliefs and practices and keeping that light for the generations to come (Iseke, 2013; Otulaja & Ogunniyi, 2017; Seehawer, 2018; Smith, 2012; Tzou et al., 2019). Tzou et al. (2019) refer to this phenomenon as presencing local or indigenous knowledge. The presentations took about one hour.

Both presentations kept most of my learners attentive and engaged with the expert community members all the way. The expert community members were happy when they discovered that their cultural knowledge was valued. For instance, Nokwakha commented that “*kungcono ukwazi ukuba njengabantu abangena mfundo kanti ulwazi lwethu lwakudala lusabalulekile kwimfundo yanamhlanje*” (It is better to discover that even we uneducated people our local or indigenous knowledge is still important in today’s education).

They further both said that they did not have enough education and they learnt the cultural beliefs and practices from their parents and share this with their own children (Kibirige & Van Rooyen, 2006; Otulaja & Ogunniyi, 2017) but that it was the first time for both of them to share it with school learners and teachers in a school context. In light of these experiences,

I believe that the community members should be invited to come and present about local or IK in schools. However, there were a few learners who were passive and looked uninterested during some parts of the presentation. When I interviewed them, they said that it is because of their religious affiliations that see anything IK as secular. It seems that these learners at first did not acknowledge that science is embedded in IK but at the end some were prepared to

⁸ Clan names are important in the African context as they help to level power gradients. For example, the first democratic president of South Africa Nelson Mandela’s clan name was Madiba and even a child could call him by it regardless of their age. In hindsight, use of clan names showed respect for research participants and is consistent with the Ubuntu paradigm used in this study (Mkabela, 2015; Ogunniyi, 2007a; Seehawer, 2018).

accommodate IK. This suggests that science teachers have an important role to play in terms of the integration of IK in their classrooms.

3.3.1.3 Teacher

Another participant and critical friend in this study was *Nomzamo*, a Grade 6 Natural Sciences teacher whom I invited in my lessons. *Nomzamo* was born in the township of Stutterheim and her clan name is *Gatyeni* married to the *Mgcina* clan. Özek, Edgren, and Jandér (2012) accentuate that a critical friend is a trusted person who will ask provocative questions. In addition, these scholars maintain that the relationship between critical friends and researchers should encourage and cultivate constructive critique. Furthermore, a critical friend provides a different perspective and new eyes. In the context of this study, I accepted any different views coming from my critical friend in order to grow professionally and for the benefit of this study. She was present at all presentations by expert community members about nutrition that integrated local or indigenous knowledge on traditional foods as well as in the lessons that I taught while she observed me. She indicated: “*I am willing to participate in the study to be able to learn more of how to integrate IK in my science lessons*”.

By participating in the study there was a mutual benefit whereby I as a researcher benefited as well as the teacher. Moreover, in her role as my critical friend, I reflected with her on how the lessons went, something that is unusual in our schools. She also took some field notes and at the end of the lesson we discussed and analysed these together. Her field notes, reflections, and the videotaped lessons were important for the triangulation of the data. Most importantly, we both learnt from the expert community members’ presentations about stories on cultural beliefs and practices on traditional foods.

As alluded to earlier, the food groups were sour milk (*amasi*), eggs (*amaqanda*), porridge made from wild vegetables (*imifino*), and meat (*inyama*). That is, learners were asked to go to their homes and community to find out stories on cultural beliefs and practices on these traditional foods. By doing so they learnt new information from the stories. The feedback I received from most learners is that their parents and the community were surprised as to why the school needed these stories which they felt are outdated. The learners were able to interact and argue with each other to defend their information they received at home and the community.

For the second, third, and fourth lessons, I invited the two expert community members who were willing to share their information to come to class to tell some stories about cultural beliefs

and practices about these different foods. For all the lessons, I encouraged learners' interactions (Vygotsky, 1978) and argumentation to take place (Ogunniyi, 2007a). With the permission of the participants, the presentations by the learners and community members, as well as the lessons, were videotaped and used with other data generation techniques in this study to help triangulate the data.

3.4 My Positionality in the Study

I conducted this study as a school principal and Grade 6 Natural Sciences teacher who has been teaching this subject for 23 years. I am therefore mindful of the fact that my position as a school principal and the learners' classroom teacher might have an effect on the power dynamics during this study. I ensured that everyone participating in this study was not obliged to participate, and could withdraw at any stage of the study.

I also positioned my learners as my *co-researchers* in this study and Nomzamo as a critical friend. For instance, learners were required to go to their homes and community to find out some information on stories on the cultural beliefs and practices about traditional foods. By doing so, it was hoped that they would be able to compare what they learn at school and home to enable border crossing (Aikenhead and Jegede, 1999; Anthony-Stevens, Mahfouz & Bisbee, 2020, Ruxton, Derbyshire & Gibson, 2020).

I also invited expert community members who are knowledgeable about cultural beliefs and practices about food and hence positioned myself as a *co-learner* during their presentations. Moreover, I was a co-learner because being a member of the Seventh Day Adventist Church, some of the cultural beliefs and practices seemed to be against what I believed – I thus regarded myself as being less knowledgeable about these.

Liebmann and Galal (2020) argue that Muslim women negotiate gender boundaries through religious-cultural demarcation. That means that disagreements and conflicts do exist between religion and culture and in my study there might be disagreements between my learners in class – and as the teacher, I should not take sides. Moreover, I was mindful that I should not impose my religion on my participants because I might learn new things from them as they also could learn new things from each other (Stott, 2016).

Notwithstanding my religious beliefs, I am passionate about the integration of IK in science lessons as I believe that this helps to contextualise and make science relevant to learners.

Similarly, it was hoped that my learners might be able to argue their points whether in favour or against the integration of IK (Ogunniyi, 2007a).

3.5 Data Gathering Methods

In this study, I used multiple data gathering methods to answer my research questions, namely, focus group interview, group activities, observations (videotaped lessons), and journal reflections. I video recorded these interactions with the permission of the expert community members and the learners. Written permission for all recordings was sought from the learners' parents or guardians, learners, and from the community members. As explained earlier, the Grade 6 Natural Sciences teacher acted as my critical friend as she was part of the study from the beginning to the end. Every comment or suggestion she made to me was received with appreciated.

Guion, Diehl, and McDonald (2010) argue that triangulation of data strengthens the research and increases the credibility and validity of the data collected. In light of this, Mills (2011) suggests that using different data gathering methods helps with triangulation of data. Concurring, September (2016) maintains that these multiple methods might provide a more holistic and comprehensive data. In addition, Cohen, Manion, and Morrison (2018) point out that using a variety of data gathering methods allows for gathering of rich data.

3.5.1 Group activities

Similarly to Shetunyenga's (2019) and Mayana's (2020) studies, I also used group activities in this study in order to create a non-threatening classroom climate for the learners so that they could be relaxed and feel free to express themselves. That is, it was hoped that this approach would enable learners to engage in arguments and express themselves optimally in smaller groups. The group activities were conducted under strict Covid-19 health protocols. All participants were supposed to maintain social distancing, wear face masks, and sanitise their hands and surfaces. The Covid-19 pandemic has affected all levels of the education system (Nicola et al., 2020). As alluded to earlier, Diwu and Ogunniyi (2012) maintain that argumentation can be accommodated in all three levels: intra (individual), inter (group) and trans (whole class). Concurring, Sedlacek and Sedova (2017) maintain that a group activity has potential to maximise active participation amongst the participants.

To facilitate active participation and hence active learning (Schudel, 2012) in this study, learners were divided into four groups in accordance to the traditional food items, namely, sour milk (*amasi*), meat (*inyama*), traditional wild vegetables (*imifino*) and eggs (*amaqanda*). Each group was given 10-15 minutes to discuss the following questions:

1. What stories about cultural beliefs related to traditional foods do you know from your homes and community?
2. What stories about cultural practices related to traditional foods do you know from your homes and community?
3. What relevance do you think these stories about cultural beliefs and practices have in science?

The responses were recorded on newsprints, which the learners subsequently used to make presentations to the entire class. These presentations then lead to group discussions and these discussions helped to reinforce argumentation as emphasised by Ogunniyi (2007a). To my surprise, the learners argued and supported their views and also welcomed other views from other learners. The group discussions took about 55 minutes. I now discuss the participatory observations and videotaping used in the study.

3.5.2 Participatory observations and videotaping

Reece and Walker (2006) define observations as the gathering of data by watching behaviour, events, or noting physical characteristics in their natural environment. These scholars believe that observations are useful as they are subjective and thus should not be used in isolation, instead, they must be used with other data gathering tools. During the presentations by the ⁹expert community members, I was a participant observer, consistent with the interpretive and Ubuntu paradigms where I could gather live data from a naturally occurring situation as highlighted by Bertram and Christiansen (2015).

What I observed during the presentations and interaction is that most of the learners were very attentive and seemed to be enjoying the presentations. Furthermore, some of the quiet learners'

⁹ I refer to the two community members involved in my study as experts since they are custodians of the cultural heritage on these traditional foods and have funds of knowledge on this.

in class were now active and asked some questions of the expert community members. Lastly, it seemed that some of the learners learnt something from the presentations, as I discovered that after a couple of months after the presentations they could recite what they learnt from the presentations.

With the permission of the expert community members who presented in class, all presentations were videotaped so that I would be able to watch these videos repeatedly to access in-depth data. A critical friend was asked to videotape all these lessons. Additionally, learners as well as the critical friend were requested to write some reflections.

When mediating learning of nutrition, a Grade 6 Natural Sciences teacher observed my lessons and also took some field notes. As a result, she kept on giving me feedback and suggestions on how to improve the next time I taught the same lesson and other lessons. That feedback helped me and forced me to re-teach the same lesson where I discovered that the learners' responses and interactions improved – credit goes to my critical friend.

3.5.3 Focus group interview

Bertram and Christiansen (2015) define interviewing as the conversation between the researcher and the respondent whereby the researcher asks the respondent questions and obtains answers (Thomas, 2013). In this study, I used a focus group interview. Dilshad and Latif (2013) describe a focus group as a group consisting of individuals with characteristics who focus on discussions on a given topic. A focus group interview is a technique involving the use of in-depth group interviews whereby participants are purposively selected (Dilshad & Latif, 2013). I chose to use the focus group interview in this study as I hoped that a non-threatening and relaxed environment might be created for my learners. In my focus group I had four learners who volunteered to take part. To my surprise all of them were girls and one boy who was also willing to take part, but who was not at school for some days due to family engagements.

The learners were so relaxed during the interview and all participated in answering my questions about traditional foods. However, some learners were quick to answer and some were slow and I tried to be patient and give them enough time. The questions were in *isiXhosa* and they were encouraged to take their time to answer in *isiXhosa* (Nhase, 2019). The critical friend was not there when I conducted these interviews and that allowed some of the shy learners to be free and open when answering the questions.

I am, however, mindful of some limitations when focus group interviews are used. For instance, a few vocal participants may dominate other members during the interview and some participants may conform to the responses of other participants even if they do not agree. Even in this study there was one girl who was more vocal than the others and as a result, other learners were quick to say they agreed with what Siyanda [pseudonym] said. To counter this, I asked some of the questions and allowed any of the three other girls to respond before Siyanda responded. I addressed this by making sure that all learners involved in the focus group took turns in giving answers. The interview took place in the afternoon at school. It took about 70 minutes and was tape recorded with the permission of the participants.

3.5.4 Journal reflections

Journal writing allows one to reflect and dig deeper into the heart of words, beliefs, and behaviours (Janesick, 1999). Agreeing, Alt and Raichel (2020) argue that reflective journals are written material that learners create as they think about different concepts with the purpose of gaining learning. In addition, these scholars maintain that questions can help teachers structuring the journals and help learners understand the process of reflective thinking. It provides learners with an opportunity to express their attitudes and be able to reflect critically on activities they are engaged in. In this study, learners were asked and encouraged to reflect in writing on all the lessons. At the beginning of 2019, I encouraged my learners to write reflections after every lesson so that by the time I conducted my research they would be used to reflecting. Extending on Mayana's (2019) study, learners were also afforded an opportunity to read out what they had written about the previous lessons. I made sure that reflections were straight to the point and were simplified through guided questions (see Appendix F).

Hemmati and Soltanpour (2012) accentuate that in journal reflections learners are in control of what, when, and how they learn. Furthermore, these scholars posit that reflections are both educational as well as for real life learning. In concurrence, Fu, Liang, Wang, Xu, and Xiao (2020) confirm that in a research conducted in China, it was revealed that the teacher played a dominant role in motivating learners' interest and in giving timely feedback. In the context of this study, the feedback was received from learners' journal reflections, which were collected as part of the data. I now present the data analysis process used in the study.

3.6 Research Process

The research process in this study was informed by Chikamori, Tanimura, and Ueno’s (2019) Transformative Model of Education for Sustainable Development (TMESD) framework. The study employed a participatory approach designed and implemented to improve IK-science curriculum research. I believed that this framework was beneficial for my study since it uses a participatory approach (see Section 3.3.1). Furthermore, Chikamori et al. (2019) suggest that the TMESD framework consists of three learning sub-processes: ‘knowing the present’, ‘past-present relationships’ and the ‘future-present’. These scholars refer to studying of past-present relationships as *retroductive* learning and future-present relationships as *retrodictive* learning (see Figure 3.2 below).

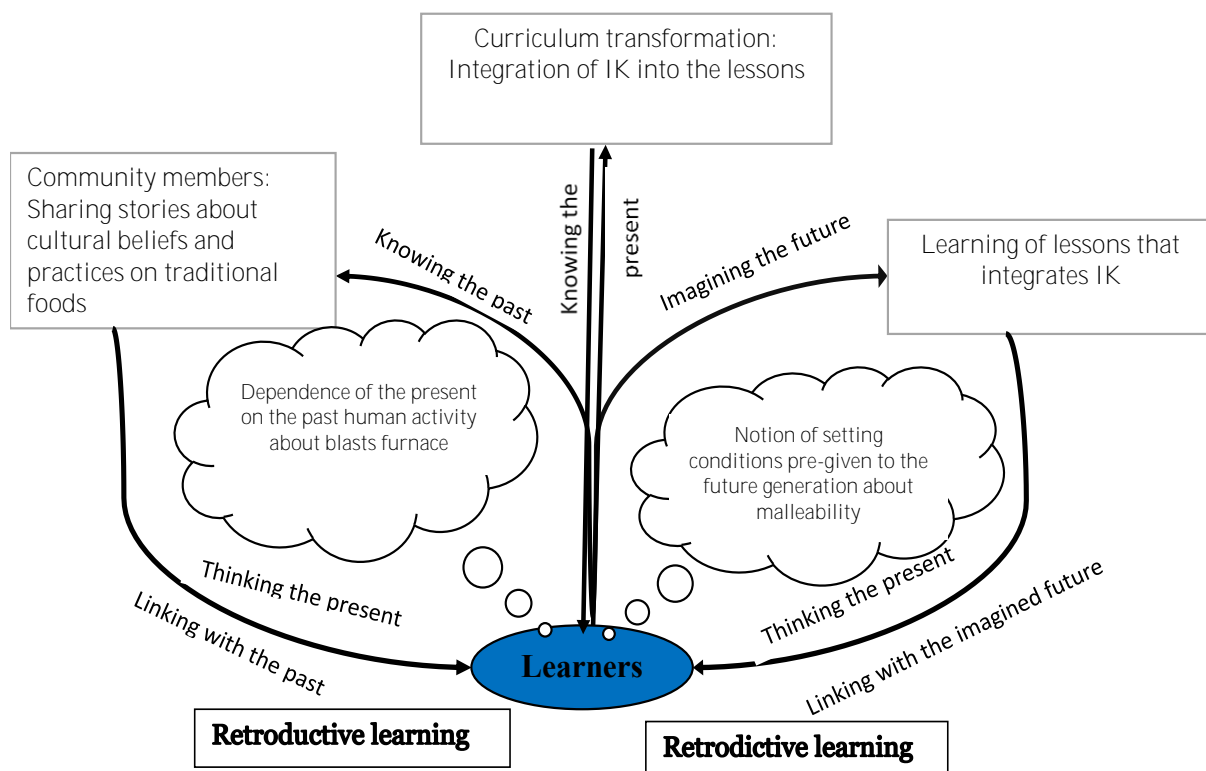


Figure 3.3: Shows the IK-science integration process in this study (adapted from Chikamori et al., 2019, p. 9)

In the context of this study, firstly, the past has to do with understanding stories on cultural beliefs and practices on traditional food items such as *inyama*, *amasi*, *amaqanda* and *imifino*. Secondly, the present has to do with how IK can be integrated in the planning of science

lessons. Thirdly, the future has to do with how lessons that integrate IK can be enacted in my science class about traditional food with the view to making science relevant to my learners.

3.7 Data Analysis

Data analysis is a process that involves organising, accounting for, and explaining data (Cohen et al., 2018). Since I generated qualitative data in this study, a thematic approach to data analysis was employed (Cohen et al., 2018). That is, data were analysed inductively through colour coding data and identifying categories and sub-themes. Thereafter, common sub-themes were combined to form themes and these were subsequently linked to literature or theory that informed this study. According to Makabela (2015), data should be interpreted from the African viewpoint. I found that appropriate in my study as I utilised some stories about cultural beliefs and practices on traditional food.

I first transcribed the focus group interview and commenced the data analysis process by writing it as a narrative story (Nhase, 2019). Similarly to Nhase's (2019) study, from those narratives, I then identified some episodes and colour coded them. Within the episodes, I identified themes and categories.

As explained earlier, some criteria from Atallah et al. (2010) were used to analyse learners' conceptions, dispositions, and interest towards learning science. This was augmented by the learners' reflections. Additionally, concepts from Vygotsky's (1978) socio-cultural theory, Ogunniyi's (2007a) Contiguity Argumentative Theory's (CAT) five cognitive states and Langenhoven and Stone's (2013) Dialogical Argumentation Instructional Model's (DAIM) five of the six stages were used as lenses to analyse data emerging from the group discussions between the learners, community members, and myself.

Participants were given feedback after data analysis. Li, Liu, and Steckelberg (2010) maintain that learners who receive feedback may make improvements accordingly. That means that feedback plays a significant role and motivates learners to perform better. Thomas (2017) argues that the ongoing contact with research participants can be part of a prolonged engagement and that a sound rapport is more likely to bring positive results between the researcher and co-researchers. In addition, Thomas (2017) suggests that it is important to send the participants a written summary of emerging themes as they are more suitable where data is obtained from the focus group interviews. Those themes will give them a greenlight of what

are the common conceptions, dispositions, and interest towards cultural beliefs and practices about nutrition.

3.8 Validity, Trustworthiness and Reliability

Creswell (2008) confirms that “validity is referred to as a sound evidence that matches its proposed use” (p. 159). Maxwell (2012), however, points out that there are two challenges to validity: *research bias* and *reactivity*. Research bias is a tendency that researchers have to try force the opinions of the participants into the result the researcher wants (Du Plooy-Cilliers, Davis & Bezuidenhout, 2014). As I said in the section about positionality (see Section 3.3.3), I tried at all cost not to force my opinions onto my participants as I was not doing the study on them but with them, as they were my co-researchers in this study.

On the other hand, reactivity occurs when individuals change their behaviour due to the awareness that they are being observed (Du Plooy-Cilliers et al., 2014). I discussed with my learners that they were welcome in the study and needed to participate fully and did not need to change their behaviour.

To ensure validity and trustworthiness in this study, I used a variety of data gathering techniques for triangulation purposes, extending from Lincoln and Guba (1985) who posit that the value of research is strengthened by its trustworthiness. Concurring, Connelly (2016) argues that trustworthiness is a degree of confidence in data interpretation and methods used to ensure quality of research. The four indicators of trustworthiness which are credibility, dependability, confirmability, and transferability helped strengthen my study. According to Amankwaa (2016) all those indicators add value to the research product. In addition, this scholar accentuates that the indicators will help making the findings applicable in other contexts. I also reflected with my critical friend to be able to validate the data generated.

3.9 Ethical Considerations

In this section, I discuss different aspects about ethical considerations in this study.

3.9.1 Respect and dignity

Makabela (2015) avers that researchers should show respect for individuals, their privacy, and confidentiality. The human rights of the participants were respected in this study. For instance, their anonymity and privacy were protected throughout the research process. During the

signing of consent letters, I assured the participants and the two expert community members that their participation was voluntary and they had a right to withdraw at any time during the study if they so wished. I also reminded the two expert community members that their presentations would be done at a convenient time and venue (school). The expert community members were told that the presentations would be recorded and they were asked to give consent. The information gathered would not be shared with any third parties without their permission.

3.9.2 Transparency and honesty

The aim of the study was explained to the participants long before they were given the consent to sign and agreed to participate in the study. The letters of consent were written in both *IsiXhosa* and English so that the participants could understand the content of the study. Similar to Mutanho's (2020) study, I found it a challenge to translate English statements to *IsiXhosa* "You can withdraw from this study any given time if you want to" (as recommended by Cohen et al., 2018). Essentially, that statement is difficult to explain and unacceptable in African culture. On the opposite side our white counterparts see nothing wrong in that statement, and that is where we see contradictions between Afrocentric and Eurocentric viewpoints (Mutanho, 2020; Mwambari, 2020).

In addition, permission to conduct the study was obtained from the district director of the Amathole West district as well as the HoD of Mdoko Primary School [pseudonym]. The learners' parents or guardians, the Natural Sciences teacher, and expert community members were all supportive in this study.

3.9.3 Accountability and responsibility

The study was conducted in accordance with the principles of the ethical policy and guidelines for educational research. My responsibility as a researcher was to create a conducive environment during the research journey. In addition, I was responsible for safekeeping of all data gathered. All research data and equipment are kept in a safe and secured place. I also contacted my supervisors for their advice about keeping this data safe.

3.9.4 Integrity and academic professionalism

The study is my own original product, and I used my own ideas and where I used other's ideas I acknowledged and referenced them using referencing guidelines from Rhodes University. The data captured were given to the participants to verify that what had been captured was correct. The study was conducted in such a way that it was free from any political, racial, and religious bias (David & Resnik, 2015).

3.10 Chapter Summary

In this chapter, I discussed the research methodology underpinning this study, the paradigms informing this study as well as the research design employed in this study. The paradigms were the interpretive and Ubuntu paradigms and the research design consisted of a case study, methodological framework (DAIM), research site and sampling, participants, positionality, and data gathering techniques used in the study. Lastly, my positionality in the study and data gathering techniques were discussed. In the next chapter, I present, analyse, and discuss the data generated from group activities and presentations by the expert community members.

CHAPTER FOUR: GROUP PRESENTATIONS AND PRESENTATIONS BY EXPERT COMMUNITY MEMBERS

4.1 Introduction

The main goal of my study was to explore mobilisation of stories about cultural beliefs and practices on traditional foods to contextualise the learning of nutrition in a Grade 6 Natural Sciences township class. In the previous chapter, I presented the research methodology informing this study.

In this chapter, I thus present, analyse, and discuss data generated from observations during the learners' group activity and the presentations made by the two expert community members. The data presented here were aimed at addressing my research questions one and two:

- What kind of stories about cultural beliefs and practices on traditional foods¹⁰ do Grade 6 learners know from their homes and the community?
- How do the Grade 6 learners interact, argue, participate, and learn (or not) during the presentations made by the expert community members on stories about cultural beliefs and practices on traditional foods?

4.2 Summary of the Qualitative Data Generated During the Group Activity

In the group activity, learners were divided into four groups of six (15 boys and 19 girls) to gather information in the community, for example, on cultural beliefs and practices on traditional foods such as *amasi*, *imifino*, *amaqanda* and *inyama*. As alluded to earlier and similar to Mayana's (2020) study conducted in South Africa, to ensure that the data generated from the group activity were relevant to the study, learners were given three guiding questions to focus on and to subsequently direct their discussions in their groups (see Section 3.5.1).

¹⁰ The traditional foods used in this study were *amasi* (sour milk), *imifino* (traditional wild vegetables), *amaqanda* (eggs) and *inyama* (meat).

The learners were given time in class to discuss in their groups and then to write down their findings on newsprints. They were given codes such as LM1 which means male learner number 1 and the others were given LF2 which means female learner number 2 and so on. After the group discussions (see Figure 4.1), each group presented their findings to the entire class as shown in Table 4.1 and 4.2 on the following pages.

The learners decided on their own to give names to their groups in accordance to the food groups they investigated, that is, *Amasi*, *Imifino*, *Amaqanda* and *Inyama*. Moreover, these learners voluntarily chose their own groups.





Figure 4.1: Boys discussing about *imifino*

Additionally, I encouraged them to have both boys and girls so that the groups were balanced and gender sensitive. The learners supported the mixed groups and that made my job easier. I also noticed that each member of the group felt a sense of belonging and they felt valued as a member of their group. This is consistent with the Ubuntu paradigm used in this study (Seehawer, 2018) (see Section 3.2).

Table 4.1: Learners presentations and newspapers about *amasi* and *inyama*

Learners presentations about <i>Amasi</i> and <i>Inyama</i>	Learners newspapers about <i>Amasi</i> and <i>Inyama</i>
 <p data-bbox="193 1070 699 1189">Learner (LF2) presenting about <i>amasi</i></p>	<p data-bbox="1018 488 1209 577">News Print Group of Maas</p> <p data-bbox="708 645 1401 1048">After the woman get married in her new home introduce her in ancestors they kill the goat that (utsiki) traditional wedding. When is going to eat of goat. they take the arm and put it in maas eat the arm of goat. They take arm in full of around it. So that mean the woman is introduce ancestors. Women or a girl must not eat amasi when she is in periods. When you are married in your husband home you must not eat amasi. In your house you eat amasi at your house.</p>
 <p data-bbox="193 1783 699 1861">Learner (LM1) presenting about <i>inyama</i></p>	<p data-bbox="943 1285 1190 1346">News print - Meat</p> <ol data-bbox="724 1420 1310 1771" style="list-style-type: none"> 1. Neck only eaten by boys. 2. Inside meat (ulusu) eaten by women. 3. Intestine is eaten by a women 4. Ribs can be eaten by a mans 5. Intestine (undonci) can be eaten by boys. 6. liver is eaten by mens only.

Table 4.2: Learners presentations and newspapers about *amaqanda* and *imifino*

Learners presentations about <i>Amaqanda</i> and <i>Imifino</i>	Learners newspapers about <i>Amaqanda</i> and <i>Imifino</i>
 <p>A learner wearing a green school uniform and a black face mask stands in front of a green chalkboard. The chalkboard has 'Amaqanda (Eggs)' written on it twice. The learner is gesturing with their hands while presenting.</p>	<p>Eggs Group</p> <p>News Print</p> <p>The reason why girls/youth were not allowed to eat eggs because they will get grown faster at the early stage.</p> <p>Another reason why girls were not allowed to eat eggs because when they are at the stage of periods they are not allowed to eat eggs and drink moas. When they are pregnant they will get miscarriage.</p> <p>When girls eat eggs they are going to be a wild person who will not listen at home and your words will be final at home.</p>
 <p>A learner wearing a green school uniform and a black face mask stands in front of a green chalkboard. The chalkboard has 'Imifino' written on it. The learner is gesturing with their hands while presenting.</p>	<p>News Print</p> <p>Imifino Group</p> <p>Men did not eat imifino because they were going to be weak. When they ate imifino they were going to be beaten by other men. When men were going to war and they ate imifino other men were going to be laugh at them. Men who did not go to war other men were saying they ate imifino.</p>

Some learners confirmed that they felt valued to be in the group when I asked them and LM3 commented that “I feel happy and valued to be the part of the group”. As a result, they took

ownership of the task and worked as co-researchers in this study. This suggests that I was doing research *with* them rather on them as emphasised by Ngcoza and Southwood (2015).

The groups were given about 15 minutes to discuss the given questions and consolidate their presentations on newsprints. Thereafter, and as alluded to earlier, they presented to the entire class. The class was given about five minutes for discussions, questions, and answers. They were within the scheduled time – the discussions were exciting and the learners actively participated throughout the presentations (Sedlacek & Sedova, 2017; Vygotsky, 1978).

All four groups presented. The groups were given codes as shown in Table 4.2 below. For example, group 1, known as *amasi* group; group 2, known as *imifino* group; group 3, known as *amaqanda* group and group 4, known as *inyama* group. The learners' presentations were on the newsprints as shown in Table 4.1 for *amasi* and *inyama* and Table 4.2 for *amaqanda* and *imifino*.

The *amasi* group believed that a newly married woman should eat the cooked front leg of a goat that is dipped in *amasi* (sour milk) to be introduced to the ancestors of that new home. In addition, they pointed out that a newly married woman should not eat *amasi* in the husband's home before this cultural practice has been done. That is, newly married women would only be allowed to drink *amasi* after the ceremony of eating a goat's or sheep's cooked leg dipped in *amasi*. This differs from one family to another, some families use goats and some use sheep and in my family, we use sheep.

An argument was started by some learners saying that it is unfair that the woman cannot eat what she wants because of cultural traditions. This seemed to be in agreement with Ogunniyi's (2007a) assertion that certain ideas are suppressed in the face of more valid reasons. In this case, the idea is suppressed because of cultural reasons. On the other hand, some argued that it is not her birth home and so she should honour the traditions of the husband's home. In my observation, I discovered that it was mostly girls who seemed against this cultural belief and in contrast, boys seemed to be in favour of this cultural practice. In essence, the girls here seemed to be challenging the cultural stereotypes that women should not drink *amasi*.

The *imifino* group believed that all men are not supposed to eat *imifino* as they would be weak. They further added that those men would be a laughing stock among other men who do not eat *imifino*. However, most of the boys argued that they see nothing wrong with men eating *imifino* because they themselves eat *imifino* at their homes. From a Xhosa perspective, men are boys

who have undergone the cultural passage to manhood (Ngcoza, 2017). This statement corroborates with Mesoudi (2009) who concurs with Ogunniyi (2007a) that culture is not static but it evolves. That means that the cultural stereotypes should be flexible and be open to consider changes in cultural beliefs. Similarly, this school of thought also resonates well with Njume, Goduka, and George (2014) who argue that *imifino* and other indigenous leafy vegetables (ILVs) formulate healthy diets in South Africa.

According to Cimi (2009), women are more knowledgeable than men when it comes to traditional leafy vegetables (*imifino*). It could be surmised that women seem to know more about the health benefits of *imifino* than men. However, the study Cimi (2009) conducted in *Makhanda* revealed that most learners felt that everybody should eat *imifino* because of its nutritional value and this coheres with Ogunniyi's (2007a) equipollent cognitive state. It also agrees with Govender (2014) who accentuates that these worldviews need to co-exist and be treated equally and has affinity with Langenhoven and Stone's (2013) call that we need the co-construction of these concepts as that will lead to cognitive harmonisation, in my case, cultural beliefs and science.

When the *amaqanda* group presented, they argued that girls should not eat *amaqanda* as they will grow faster than those not eating *amaqanda*. In addition, they maintained that should they eat eggs they would go wild as they would be sexually active and then run after boys and not listen to their parents. The argument started similarly to the *amasi* group above and girls regarded the cultural practice as being oppressive. For instance, LF2 lamented that, "*this is oppressive if it is only directed to girls only, what about boys?*" I heard most of the girls shouting and saying, "*yes, unyanisile*" which means that "*she is right*".

These girls concurred with Ruxton, Derbyshire, and Gibson (2010) who argue that eggs contain a variety of important vitamins, minerals, and trace elements. However, another boy raised his hand and opposed what the girls were arguing about. LM4 was of the view that the cultural traditions about food, especially eggs, must be maintained and everyone must respect it – this is consistent with Ogunniyi's (2007a) dominant state whereby a more powerful idea suppresses others (Govender, 2014). I think that a powerful idea should not be enforced as it can suppress ideas, in this case of the women: "*amantombazana mawalulamele ilizwi labadala angabuzi imibuzo*" (The girls must respect the word of the old and stop asking questions). The learners' presentations concurred with Langenhoven and Stone's (2013) stage three of group tasks (inter-dialogical argumentation) that makes the point that ideas are shared within the groups.

The *inyama* group especially boys believed that certain meat should be eaten by certain groups of people. They averred that, for example, neck and another kind of intestine (*undonci*) can only be eaten by boys. This was seen by a certain girl (LF4) as not fair as believed all people including girls should be allowed to eat that kind of meat. The group also argued that the meat that is believed to stimulate sex hormones should be given to men as well. In the context of this study, we see the cultural beliefs prioritising men over women, with men being the dominant group while women are seen as the suppressed group (Ogunniyi & Hewson, 2008; Ogunniyi, 2007a). Agreeing are Ekebas-Turedi, Uk, Basfirinci, and Pinar (2020) who posit that certain food items are associated with a specific gender.

From the learners' presentations three themes emerged, namely, cultural beliefs related to food; cultural practices related to food; and relevance to science (or not). These themes emerged from the analysed data in order to answer research questions one and two of the study. I went through the four presentations of the learners, summarised them and present them in Table 4.3 below.

Table 4.3: Showing group responses on the Group Activity

From guiding questions	<i>Amasi</i>	<i>Imifino</i>	<i>Amaqanda</i>	<i>Inyama</i>
Theme 1: Cultural beliefs related to food	<p>There is a belief that as a woman you must not drink <i>amasi</i> during pregnancy.</p> <p>Women must not eat <i>amasi</i> during menstruation as it will prolong your time.</p>	<p>There is a belief that men must not eat <i>imifino</i> as they will be weak.</p> <p>If a man sleeps during the day he will be criticised as it is because he is eating <i>imifino</i>.</p>	<p>There is a belief that both boys and girls were not supposed to eat <i>amaqanda</i> as they will run after the opposite sex.</p> <p>Married women are not supposed to eat <i>amaqanda</i> as they will be unfaithful to their husbands.</p> <p><i>Amaqanda</i> must only be eaten by men, to be strong men.</p>	<p>The Xhosa people believe that youth must not eat inside meat as it will stimulate their sex hormone.</p> <p>A married woman must not eat inside meat as it will increase their sex drive</p>
Theme 2: Cultural	<p>During a traditional wedding, the bride can only eating <i>inyama</i> once it is</p>	<p>Only women can eat <i>imifino</i> in their homes and anywhere, that is</p>	<p>Men were eating eggs to be strong and productive.</p>	<p>During traditional ceremonies inside meat is not eaten by the youth as it</p>

practices to food	dipped in sour milk (<i>Amasi</i>). After the family of a bride brought some clothes it is only then the bride is allowed to drink <i>amasi</i> .	why they are physically strong.	Youth and women were only getting proteins from other food groups than <i>amaqanda</i> . <i>Amaqanda</i> have side effects that affect the way we behave against our culture.	stimulates their sex hormones. Even a married woman is not allowed to eat inside meat, they only cook it for men.
Theme 3: Relevance to science	Some find that there is relevance with science because <i>amasi</i> prolongs menstrual period. Some don't think there is much relevance with science for example drinking <i>amasi</i> and miscarriage.	We find no relevance as there is no scientific evidence that men eating <i>imifino</i> will be tired and weak.	We find relevance that youth who eat <i>amaqanda</i> become sexually active.	We don't think they have much relevance for example there is no scientific evidence that eating inside meat will make one sexually active. Some find that there is no scientific evidence that when a pregnant woman eats bone marrow, she will give birth to a child with runny nose.

Ogunniyi's (2007a) Contiguity Argumentative Theory (CAT) was used to make sense of the data during the discussion and analysis. The five cognitive states are dominant, suppressed, assimilated, emergent and equipollent (see Section 2.6.1).

The results showed that there is a belief that a pregnant woman should not drink *amasi* as her menstruation period will be prolonged [suppressed]. According to the *Amasi* group, the belief is that should a woman drink *amasi* during pregnancy the chances of miscarriage would be high [dominant]. The *imifino* group believed that men eating *imifino* would be seen as weak among men. They also believed that men must not sleep during the day as it will be said that it is because he eats *imifino* [emergent].

During the presentation, LM1 shared that if two men fight whereby one is eating *imifino* and other one is not, the one eating *imifino* might be conquered. This is attested by the comment made by Webb (2013) who maintains that one idea is suppressed and subordinated to a culturally dominant one, in this case the cultural belief about eating of *imifino* by men. Notwithstanding these cultural belief about *imifino*, Njume et al. (2014) do not agree with the belief that men should not eat *imifino*, arguing that some health problems can be prevented by the inclusion of *imifino* in their diet.

The *Amaqanda* group believed that youth should not eat eggs as it would make them sexually active at an early stage. They also believed that married women should also not eat eggs as it would make them wild and they would be unfaithful to their husbands. During the presentations, LF2 asked: “*Ingaba yinyani na ukuba xa inenekazi litya amaqanda, lizakukhawuleza likhulelwe ngokulula*” (Is it true that if a woman eats eggs, she gets pregnant easily?). Nokwakha, the expert community member agreed and said: “*Yes, it is true as our culture told us that*”. Not questioning things in the African culture also has affinity with Lunde, Johansen, Iren-Hauge, and Sagbakken’s (2020) study conducted in Norway that revealed that It is difficult for women to express any views on female circumcision as that will be seen as being against the practice. That makes the women feel oppressed and fearful to ask questions about the cultural practice of women circumcision.

The *Inyama* group believed that inside meat does stimulate sex hormones and they warned youth from eating it. LF4 coming from the coloured community disagreed, arguing that certain meat should not be eaten or be attached to a particular group of people. She believed that every person should eat any meat of their own choice [equipollent]. Ogunniyi and Hewson (2008) posit that this happens when two competing ideas coexist and have equal force in one’s beliefs. In this study, it is when the dominant view (cultural beliefs) and the suppressed (minority culture) need to coexist and complement each other. This finding also corroborates with Ogunniyi (2007a) who argues that different worldviews must not compete but complement each other. That is in line with Langenhoven and Stone’s (2013) DAIM who suggest that the two concepts should work together leading to cognitive harmonisation of dominant and suppressed views. Concurring, Das and Singh (2014) aver that men feel less threatened about their patriarchal privileges and one of those privileges are that men are seen as superior to women. Meaning, that men are given more benefits and privileges, including eating certain types of food such as meat and eggs, than women.

Regarding cultural practices about *amasi* (sour milk), the *amasi* group pointed out that during a traditional wedding, the bride (*umakoti*) can only eat meat when it is dipped in *amasi* – the practice is called *utsiki* when *umakoti etyiswa amasi* (the young married bride is eating sour milk). From that day, the bride cannot eat *amasi* until her family brings in gifts for her (*ukwambesa*). The question that was asked by Nomzamo was, “*Can the bride drink amasi when she visited her own home?*” In her presentation Nomalanga strongly argued that is not allowed and does not respect their culture; if they are not respecting their culture, there will be some consequences for that according to Leape et al. (2012).

The *imifino* group maintained that only women can eat *imifino* at home and at all traditional ceremonies; the opposite view is that men are not allowed to eat *imifino* privately or publicly as that would make them weak. Most boys believed that they do eat *imifino* and see nothing wrong with that and this has affinity with Ogunniyi’s (2007a) equipollent cognitive state. Such a school of thought is consistent with Taleni and Goduka (2013) who aver that *imifino* is an important source of medicine that strengthens the immune system – this is important during the Covid-19 pandemic and beyond.

Regarding cultural practices about *amaqanda*, the *Amaqanda* group suggested that only men are allowed to eat *amaqanda* whether at home or in traditional ceremonies as it would make them strong and stimulate their sex drive. However, they emphasised that youth and married women are not allowed to eat *amaqanda* in their homes and in traditional ceremonies as that would stimulate their own sex drive and could affect the married women so that they would be unfaithful to their husbands. LF3 seemed curious and asked the following question: “*Why amaqanda are not good for married women?*” The presenter Nokwakha reiterated that women are there to give birth and multiply the family but when they eat eggs this will have a detrimental effect as it would increase their sex drive, making it more possible they would be unfaithful to their husbands.

Regarding cultural practices involving *inyama* (meat) – in all traditional ceremonies when a cow is slaughtered there is some meat that has to be eaten by different people, for example, inside meat is not given to the youth and married women as it is believed that it will stimulate their sex drive. It seems only men are allowed to boost their sex drive as they are given inside meat to be able to perform all their duties at home. Youth and women are given their own meat that they are allowed to eat during traditional ceremonies.

Pertaining to relevance to science, the *Amasi* and *Amaqanda* groups found relevance with science arguing that *amasi* is nutritious but can prolong menstrual periods and that youth who eat eggs become sexually active. The following groups *Amaqanda*, *Imifino* and *Inyama* indicated that they found no relevance at all in *amasi* leading to miscarriage; that men eating *imifino* would be weak; that inside meat would make someone sexually active; and that if a pregnant woman eats bone marrow she would give birth to a child with a runny nose. Instead, they believed that there is no scientific evidence that proves these things and that agrees with Webb (2013) who suggests that in some cases, there is no clear indication or relevance between Xhosa IK and science.



The learners found all these presentations useful and they benefited from them. This is attested by the comment made by Khupe (2014) who argues that the Zulu culture and knowledge are best learnt in the Zulu language. Meaning, that to teach the culture of a certain group is best done in their own language – in the context of this study in *IsiXhosa*.

On reflection, as I observed the group activity session it was clear that learner participation was high (Sedlacek & Sedova, 2017). That is, the learners showed interest and were willing to learn and even those who are always quiet during the lessons were participating during this session. This finding has affinity with Vygotsky (1978) who suggests that learners learn best through social interactions. Additionally, the discussions and argumentation during the group activity session provided learning opportunities for the learners (Ogunniyi, 2007a). That shows that when the environment is less threatening and the cultural capital of the learners is valued, effective learning takes place.

4.3 Presentations by the Expert Community Members

This section begins with expert community members cultural heritage (Table 4.4). These expert community members were invited to present a lesson to the Grade 6 Natural Sciences class of Mdoko Primary School on cultural beliefs and practices on foods such as *amasi*, *imifino*, *amaqanda* and *inyama*.

Table 4.4: Expert community members’ cultural heritage

Expert Community Members	Raw data
 <p data-bbox="204 1025 911 1064">Presenter 1 (Nokwakha) presenting to the class on day 1</p>	<ul style="list-style-type: none"> • We should go back to our roots • Men eating <i>imifino</i> will be a laughingstock among other men • <i>Amasi</i> is not allowed to be taken by pregnant women • Women eating <i>amaqanda</i> can be unfaithful to their husbands • Women are not allowed to eat inside meat
 <p data-bbox="204 1693 874 1731">Presenter 2 (Nomalanga) presenting in class on day 2</p>	<ul style="list-style-type: none"> • There are disadvantages to drinking amasi by women • She is not prepared to share the above with learners as young as they are • Men eating <i>imifino</i> will be <i>unyenyenze</i> (weak and a laughingstock) • Drinking amasi does prolong menstruation • Umthala (tripe) should only be eaten by the old women

For instance, Nokwakha was born and bred in Cofimvaba while Nomalanga was born in Cathcart. As a result of the geographical areas where they were born, I noticed some similarities and differences. They both agreed that men are not allowed to eat *imifino*, but they disagreed

about who is not allowed to eat *amaqanda*. Nokwakha believes both boys and girls, while Nomalanga believes that only girls are not allowed to eat *amaqanda*. Both of their husbands are from Cathcart. Their ages are different; Nokwakha is eight years older than Nomalanga. They are both retired members of the community and former SGB members of Mdoko Primary School. Nokwakha's highest standard is standard 4 and she can speak *IsiXhosa*, English, and Afrikaans. On the other hand, Nomalanga has a standard 6 and can speak *IsiXhosa*, English, and *Isizulu*. They are both grandparents and their grandchildren are learners at Mdoko Primary School and they attend the parents' meetings regularly.

They are both *isiXhosa* home language speakers and that assisted this study as they were understood by the learners who were also *IsiXhosa* speakers (Diwu & Ogunniyi, 2012; Khupe, 2014). Diwu and Ogunniyi (2012) argue that utilisation of home language in supporting the Dialogical Argumentation Instructional Model (DAIM) has demonstrated an upper hand in allowing learners to freely express their IK without feeling intimidated in the class. This is in line with Khupe (2014) who accentuates that there is value in home languages if you are dealing with indigenous people. This was revealed in her study conducted in Mqatszeni village, KwaZulu-Natal, where in her case *IsiZulu* was used by community members.

4.3.1 Summary of the presentations by the expert community members

The two expert community members came to class with much indigenous knowledge as the custodians of indigenous practices. According to Zapata-Calle (2016), women appear to be the prime custodian of the indigenous knowledge systems. The learners were so curious about what these community members were going to present in class. To their surprise they were overwhelmed by the cultural beliefs and practices embedded in *amasi*, *amaqanda*, *imifino* and *inyama*. Themes and sub-themes are shown in Table 4.5 on the following page.

Table 4.5: Shows themes that emerged from the data and supporting theory or literature

Themes	Sub-themes	Literature Review	Frameworks
Theme 1: Nature of interaction	Learner talk Asking questions Listening attentively	McRobbie & Tobin (2007) Sedlacek & Sedova (2017)	Vygotsky (1978)
Theme 2: Nature of participation	Explaining Elicitation of prior knowledge Promoted dialogue and arguments	Sedlacek & Sedova (2017) Khupe, 2014 Ogunniyi (2007a); Govender (2014)	Vygotsky (1978)
Theme 3: Nature of learning opportunities	Promoting of border crossing Promoted arguments dialogues and arguments Using language as a resource Showing understanding	Aikenhead & Jegede (1999) Ogunniyi (2007a); Langenhoven & Stone (2013) Hewson et al. (2009) Kibirige & Van Rooyen (2006); Webb (2013)	CAT Ogunniyi (2007a); Ogunniyi & Hewson (2008); Govender (2014)

In this section, I present the themes that emerged from the presentations by the expert community members presented in relation to the literature and theory. The socio-cultural theory and CAT were used during data interpretation and discussion. For example, Vygotsky (1978) argues that the nature of social interactions play a crucial role in the cognitive development of a learner and what is learned in class. Extending on Ogunniyi's (2007a) seminal work,

Govender (2014) posits that there must be a nature of participation to encourage argumentation in class among students. On the nature of learning opportunities Aikenhead and Jegede (1999) suggest that there must be border crossing between local knowledge and school science. I present each of these themes below.

4.3.1.1 Nature of interaction between the expert community members and learners

The two expert community members presented lessons separately on cultural beliefs and practices about food to the Grade 6 Natural Sciences class of Mdoko Primary School. The learners were relaxed, excited, and curious as they watched the community members presenting in their class. The language *isiXhosa* played a sterling role in creating a conducive learning environment in the class (Dahal, 2018; Diwu & Ogunniyi, 2012; & Hewson, Javu, & Holtman, 2009).

Nokwakha started her presentation by telling the learners that we need to go back to our roots. This statement has affinity to Chikamori et al.'s (2019) notion of taking into consideration the past (*retroduction*) in order to move to the future (*retrodition*) (see Section 3.2). When she said this, I noticed that the learners looked relaxed and were listening attentively to her. They were also calm and ready to hear what she was going to say about food and cultural beliefs. I learnt that it is very important to capture the learners' attention in order for them focus on my lessons. LM1 asked this, "*Ingaba yinyani ukuba indoda etya imifino ithambile yaye ingoyiswa yindoda engawutyiyo imifino?*" (Is it true that the man who eats *imifino* will be weak and will be overcome by the man not eating *imifino*?). Nokwakha concurred with a learner that had answered yes to this question and said that a man eating *imifino* will be weak and is a disgrace among men. My observation is that girls were asking questions associated with women not eating eggs and not drinking *amasi* during menstruation. On the other side, boys were mainly asking questions about why men were not allowed to eat *imifino*.

Another presenter Nomalanga also came wearing the traditional attire that is worn by women during traditional ceremonies. When I asked Nomalanga why she was wearing this, she argued that she did so because it showed she respected our cultural beliefs. The learners were so curious and excited to listen and interact with the presenters as they liked her traditional attire. Orell and Philaju (2020) believe that cooperation between home and school are seen as an integral part to the function of schools, which is why the integration of indigenous knowledge is important and should be supported.

The presenters explained the cultural beliefs and practices about food items such as *amasi*, *imifino*, *amaqanda* and *inyama*. When the presenters were talking about the fact that the drinking of *amasi* was prohibited to be eaten by women in their periods. LF2 asked

Ngaphandle kokwandisa ukuba sexesheni kwakho kwakho ingaba zikhona ezinye iingozi zokusela amasi? (Other than prolonging your menstruation are there any other dangers associated with drinking amasi?)

Nomalanga (see Figure 4.2) answered by saying that *amasi* during menstruation is not good. She added that there were also other disadvantages but she was not prepared to share that with the learners as they were still young to understand them. When I asked her about other disadvantages of drinking *amasi* by women she confirmed that it would make them fall pregnant easily.



Figure 4.2: Learners listening to the presenter

Learners interacted with the presenters and LF2 further asked the following question “*Ingaba inyanisile into ethi ukuba utya amaqanda uzakukhawuleza ukhulelwe lula?*” (Is it true that if you eat eggs you will fall pregnant easily?). Nomalanga with a smile on her face agreed and said that is true.

Nomzamo (see Figure 4.3 on the following page) asked the following question, since as a married woman (*makoti*) you are not allowed to drink *amasi*, if you visited the home of your birth could you steal *amasi*? Nomalanga emphasised that this was not allowed and could have

some implications if we did not respect our cultural beliefs and practices – this resonates with Leape et al. (2012) who warn us against disobeying cultural beliefs.



Figure 4.3: Nomzamo asks presenter 2 (Nomalanga) about *amasi*

4.3.1.2 Indigenous practices and knowledge about food

As I was a participant observer during the presentations, I also had an opportunity to ask some questions of the two expert community members to get a better understanding as well as in relation to the aim and purpose of the study.



Figure 4.4: The researcher as a participant observer asking questions for clarity

Cohen et al. (2018) suggest that quality observations are more than just looking but that a researcher should closely monitor facts and practices of the target groups without attempting to change them. In my case, I asked them to categorically explain some cultural beliefs and practices about food items such as *amasi*, *imifino*, *amaqanda* and *inyama*. I also asked them if we should follow all of these cultural beliefs and practices in this modern time and why?

Regarding *amasi*, Nokwakha asked that “*Ngowuphi apha kuni owakha wambona umakoti esela amasi?*” (Is there anyone who has ever seen a newly married woman drinking sour milk?). Most of the learners answered that they have not seen them drinking sour milk except for LM4 who said that he has seen his mother, who is a married woman drinking sour milk. He said that his mother has been married 15 years and she qualifies to drink *amasi*. Then Nokwakha explained that our culture does not allow a woman to drink *amasi* before her family comes with gifts after the traditional wedding – this is called *umembeso* in *isiXhosa* – or when she is pregnant as that could lead to miscarriage. She also suggested that a woman is not supposed to drink *amasi* during her menstrual periods as it will prolong them.



Figure 4.5: Girls discussions about *amaqanda*

I allowed my learners to discuss *imifino*, *inyama*, *amasi* and *amaqanda* to discover if they agreed with the expert community members.

Nomalanga concurred that the drinking of *amasi* can prolong the menstruation time of a woman. In light of this, Zepro (2015) argues that pregnant women in developing countries are obligated to avoid specific foods like milk due to cultural beliefs. Furthermore, this scholar

accentuates that in Ethiopia, pregnant women are forbidden from eating all foods with a white colour such as milk and fatty meat. These foods are believed to stick to the body of the newly born baby.

Nomzamo (see Figure 4.4) asked the question whether outside menstruation, a woman could drink *amasi*. The presenter (Nomalanga) agreed with Nokwakha and answered that, “*Nje ngomakoti amasi awuwaseli de usapho lwakho luzise iimpahla nezipho zakho*” (You can only drink *amasi* after your family come for *umambeso*).

Both presenters agreed that men were not encouraged to eat *imifino* as it is believed that men doing so would become weak and tired. I then noticed a sense of humour among learners when they stated that a man eating “*imifino iba ngunyenyeny*” (He becomes weak and will be a laughingstock among other men). Nokwakha further added that a man is not supposed to sleep during the day and if he does, he will be accused of eating *imifino*.

Nomalanga argued that *imifino* makes women strong while it does the opposite in men and makes them weak. She added that should men eat *imifino* they would be weak and fail to do some of their chores at home. Nokwakha asked if the boys would continue eating *imifino* or not? Most boys confirmed that they would continue eating *imifino* as they believe that there is nothing wrong with eating them as they see their fathers eating them – this is an equipollent cognitive state according to Ogunniyi (2007a). I also later had conversations with the expert community members for them to clarify that, since boys are not regarded as men in the Xhosa culture, should they be allowed to eat *imifino* or not.

According to both expert community members, *umakoti* (a newly married woman) is not supposed to eat eggs and should she eat eggs she might go astray and be unfaithful to her husband. Nokwakha argued that the *umakoti* is there to increase the family and not to go astray and be unfaithful to her husband. She gave an example that most of the women eating *amaqanda* are unfaithful to their husbands.



Figure 4.6: This learner (LF2) looked shy when *Nokwakha* was presenting about sexual issues when girls eat *amaqanda*

From this photograph, it seems that learner LF2 might have come from a home that is culturally conservative, where they do not discuss sexuality issues with kids as doing so is seen as a cultural taboo.

Nomalanga concurred with Nokwakha and said that “*mna nabanye amakhosikazi sendile kuba zange siwatye amaqanda sahlonipha ilizwi labadala*” (Me and others we are now married because we did not eat *amaqanda* and respected the words of the elders).

LF3 commented that since eggs are so nutritious and needed by the body, she was puzzled why they are not allowed to eat them. This learner is akin with Ruxton, Derbyshire, and Gibson (2010) that aver that eggs provide the richest mix of essential amino acids. Nokwakha answered that she agreed about the nutritious value of eggs but argued that there are also some side effects that can affect the way we behave as far as our culture is concerned. In addition, she maintained that the proteins in *amaqanda* will make one go wild and the teenage pregnancy rate would increase. It seems there was a tension between culture and westernised knowledge here and this might have caused dissonance amongst the learners (Perri & Anderson, 2014). Such tension might have a negative impact on the border crossing from home to school science (Aikehead & Jegede, 1999).

4.3.1.3 Nature of learning opportunities

The two expert community members disagreed as to who is not supposed to eat *amaqanda* in their youth. For instance, Nokwakha suggested that all youth, both boys and girls are not allowed to eat *amaqanda* and that it would prevent them from going after the opposite sex. But Nomalanga had a contrary view, saying it is only girls who are not allowed to eat *amaqanda*. This contradiction between the expert community members about *amaqanda* and youth show that there are some differences in interpretation, meaning that the cultural practices are interpreted differently in different settlement areas. This suggests that the cultural beliefs and practices that are passed from generation to generation (Kibirige & Van Rooyen, 2006) might be interpreted and hence practiced differently.

Both expert community members agreed that inside meat is not to be eaten by the youth as it will stimulate their sex hormones. However, my experience was different to Nokwakha's, as in my location during traditional rituals *intsonyama* is eaten by the whole family young and old with no discrimination, but for ethical reasons I did not challenge this. In addition, Nokwakha confirmed that even the *makoti* (newly married woman) is not allowed to eat inside meat as it would stimulate her sex drive.

Nomalanga had a contrary view that the game meat that is known as a sexual stimulant is suggested to be eaten by men only and not women. Both expert community members concurred that *ulusu* (tripe) is only for older men and women and cannot be eaten by the youth.

After the presentations by the expert community members, I asked them the question “*Is there any other cultural belief and practice from the community you can share with us?*” After a brief silence, LF2 contributed that “*omnye umakhulu uthi ukuba inenekazi elikhulelweyo litya umongo lizakuzala umntwana onemifinya*” (One of the grandmothers said that if a pregnant woman eats bone marrow, she will give birth to a child with a runny nose). LM2 added that “*ndive ngomnye umama ukuba inenekazi elikhulelweyo lithelaty izintso liyakuzala umntwana onempandla*” (I heard it from another mother that if a pregnant woman eats a kidney, she will give birth to a child with a bald head).

Both Nomalanga and Nokwakha were in unison about the cultural belief that when a pregnant woman ate bone marrow she would give birth to a child with a runny nose. However, they did not agree about the latter as only Nomalanga agreed that if a pregnant woman ate a kidney she would give birth to a child with a baldhead. Nokwakha revealed that she is not aware about

that – what she knows is that a pregnant woman is not supposed to eat chicken as she will give birth to a child who will not sleep normally and will always awake now and then. Furthermore, Nokwakha concluded that they were told that a pregnant woman should not stand inside the house and look through the window as that can create some complications when delivering the baby at home when that was still done.

After those two answers there was some humour in the class between the learners themselves as they laughed. Those answers were debated as to whether they were ‘myths’ or ‘facts’. This resonates with Kibirige and Van Rooyen (2006) that cultural beliefs should be debated to minimise some misconceptions. In agreement, Horsthemke and Schaefer (2007) warn against any assumptions than anything indigenous should be accepted or embraced as science. Notwithstanding, most of the learners were in agreement that it might be a ‘myth’ until it is proven scientifically.

4.4 Chapter Summary

In this chapter, I presented, analysed, and discussed data from the learners’ group activity and presentations by the two expert community members. This was aimed at answering my first and second research questions of my study. The findings revealed that some of the food items such as eggs and certain inside meat can enhance sexual hormones which is why cultural beliefs and practices seem to prohibit youth and women from eating them. It also emerged that these cultural beliefs and practices should be looked at from a nutritional value point of view. In addition, the findings revealed that some of these cultural beliefs and practices are not necessarily relevant to science and there is no scientific evidence that they enhance sex hormones. In the next chapter, I analyse, present, and discuss the data generated from the lesson observations, focus group interviews, and learners’ journal reflections.

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

5.1 Introduction

In the previous chapter, I presented, analysed, and discussed qualitative data from the learners' group activities as well as from the presentations from two expert community members. In this chapter, I thus present, analyse, and discuss qualitative data generated from observations from my lesson presentations about food such as *amasi*, *imifino*, *amaqanda* and *inyama*, focus group interviews, and learners' journal reflections. Such data were used to answer the following research question:

How do Grade 6 learners' conceptions, dispositions and interest shift/evolve (or not) as a result of the presentations by the expert community members on stories about cultural beliefs and practices on traditional foods such as amasi, imifino, amaqanda and inyama?

5.2 Data generated from lesson observations

In this section, I discuss the data generated through three lessons that I taught on food groups such as carbohydrates, proteins, oils and fats, and the intervention lesson that integrated indigenous knowledge when teaching the topic on food groups. All the lessons were video recorded with the permission of the participants.

Table 5.1: Data gathering tools and codes in data discussion of data in this section

Data gathering tools	Codes used in data discussion of data
Lesson on practical activities	L1PA - L34PA
Lesson that integrated indigenous knowledge	L1LIK – L34LIK

Learners' journal reflections	L1J, L2J, L3J, L6J, L7J, L10J, L11J, L12J
Focus group interviews	FGI
Focus group codes were	MAFGI, NYFGI, MIFGI, QAFGI

Twelve learners' journal reflections were analysed as indicated in Table 5.1 as only 12 learners submitted their journal reflections. Learners' journals were coded, for example, L9J is learner 9 journal reflections and L12J for learner 12 journal reflections. The codes for *amasi*, *imifino*, *inyama* and *amaqanda* groups are used throughout the thesis.

5.2.1 Data generated from the lessons about food groups

I presented a lesson on food groups prior to the intervention lesson that integrated IK and science, and learners were actively involved (Sedlacek & Sedova, 2017). The CAPS document (DBE, 2011) suggests that teachers should teach the following activities such as sorting food into four different nutrient groups like carbohydrates such as mealies; proteins such as eggs and meat; vitamins and minerals in vegetables. "The Specific Aim 3: Science, Technology and Society which prescribes that learners should understand the practical uses in Natural Sciences in society and environment and have values that make them caring and creative citizens" (DBE, 2011, p. 10). This suggests that there should link between the home and school science as reiterated by Aikenhead and Jegede (1999) and Anthony-Stevens, Mahfouz, and Bisbee (2020).

The topic is about food groups in the South African food guide. Food can be grouped according to the main nutrients the food contains and their functions in the body. The first activity I gave to my learners had pictures with food groups from the Platinum Natural Sciences and Technology Grade 6 textbook. Learners had to match the food picture with the description such as (a) carbohydrates for energy (b) protein for growth and repair (c) vitamins and minerals for good health (d) oils and fats for insulation and protection for nerves and organs and (e) dairy products for healthy bones and teeth.

There was interaction among the learners as they discussed in groups and came up with some answers. For example, LF4 answered that meat has protein for growth and repairs the body. The other learners had smiles on their faces and gave a big round of applause. I then asked

them to give me other examples of proteins in the pictures for growth and repair other than meat. There were many hands up in the class and LM2 and LF5 mentioned eggs (*amaqanda*) and milk (*ubisi*). I then asked them about the nutritional value of *amasi* and they mentioned that it contains proteins that are needed by the body.

Another activity had to do with sorting food items from a word bank into five different groups to consolidate the learning of food groups.

Table 5.2: Shows an activity for learners to sort out food items from a word bank into five different groups

Starch	Dairy	Vitamins and Minerals	Protein	Oils and Fats

<p>WORD BANK</p> <p>Apples, Lentils, Bread, Mince, Spinach, Peanut butter, Banana, Milk, Rice, Cheese, Maas, Breakfast cereal, Pasta, Eggs, Broccoli, Nuts, Cabbage</p>
--

Most learners were able to sort different food items into different food groups. However, there were a few learners who struggled and I gave the task to those who could sort to help those who struggled – those helping other learners’ according to Vygotsky are the more knowledgeable others (MKO) (Vygotsky, 1978).

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Starch	Dairy	Vitamin and Minerals	Protein	Oils and Fats
Rice	Milk	Broccoli	Eggs	Nuts
Pasta	Cheese	Lentils	Mince	Peanut butter
	Maas	Breakfast cere		
		Apples		

WORD BANK

Apples, Lentils, Bread, Mince, Spinach, Peanut butter, Banana, Milk, Rice, Cheese, Maas, Breakfast cereal, Pasta, Eggs, Broccoli, Nuts, Cabbage

Starch	Dairy	Vitamins and Minerals	Protein	Oils and Fats
Rice	Milk	Banana	Cabbage	Eggs
Broccoli	Maas	Mince	Spinach	Cheese

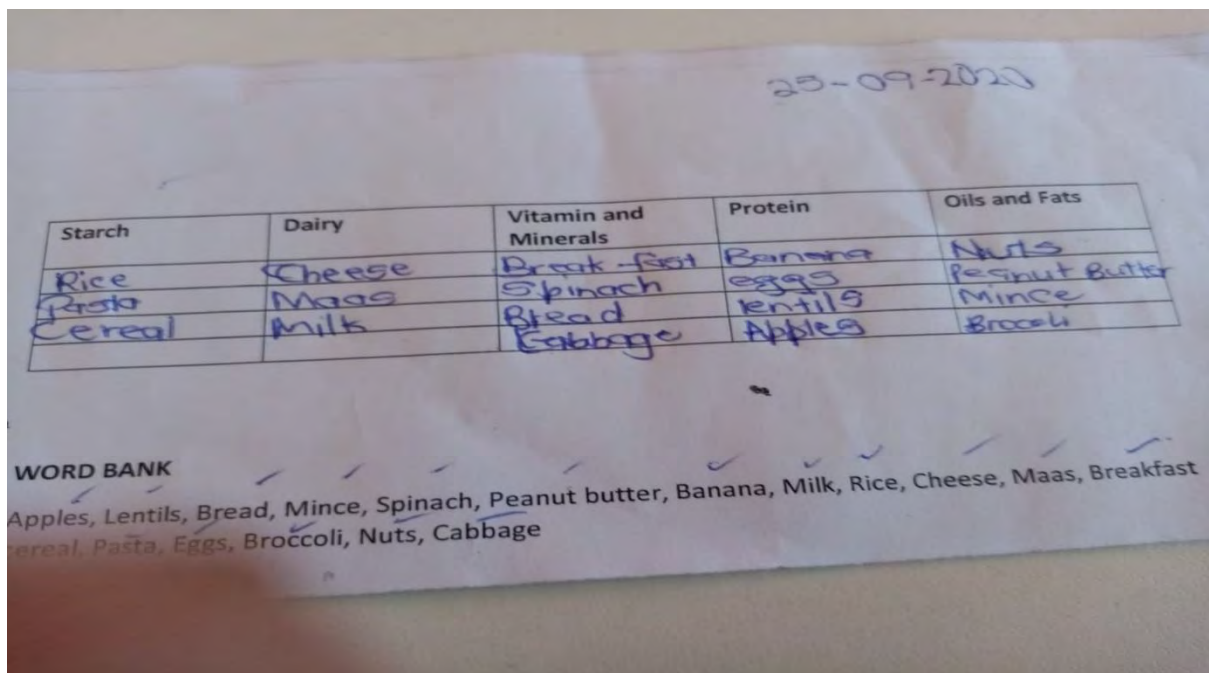


Figure 5.1: Examples of learners' answers

5.2.2 Data generated from a lesson that integrated indigenous knowledge

The science teacher who was my critical friend was present when I taught the lesson that integrated indigenous knowledge (IK). I taught the topic that dealt about cultural beliefs and practices about food items such as *imifino* (carbohydrate & vitamin and minerals). The vitamins are so vital for the immune system and that was emphasised more during Covid-19. This suggests that if men do not eat *imifino* they would miss out on essential nutrients. *Amasi* also has some bacteria which assists with digestion (protein), *amaqanda* (protein) and *inyama* (protein). The lesson was video recorded.

The activity is the case study about *morogo* (local wild spinach in Sesotho). *Morogo* is used in the textbook instead of *imifino* that is used in the Eastern Cape as a traditional leafy vegetable. It goes on to say that *morogo* is a dish made from the leaves of a group of traditional vegetables that grow in different parts of South Africa. *Morogo* is similar to spinach but it can grow well in areas where other vegetables struggle to grow. This indigenous plant needs little water or fertiliser. Its leaves provide protein and vitamin A and they have plenty of minerals and calcium.

For this activity, learners were asked the following question: “Why is *morogo* easy to grow in South Africa?” I gave them time to discuss and interact with each other in their groups (Vygotsky, 1978). I also observed as each learner tried to answer the questions about the health benefits of *morogo* – most of them had different answers. For example, LM4 explained that it has vitamins and minerals and has adapted to the South African conditions. His group members nodded their heads when he answered that question. Additionally, LF3 answered that it is because our soil is compatible for that plant and most learners seemed pleased with that answer.

It is clear that *morogo* is one of the indigenous plants and it can grow and survive in all conditions. Because of the proteins, vitamin A, iron, and calcium found in *morogo* it is so important that everyone benefits from eating it for health reasons. In contrast, however, there are cultural beliefs and practices that disallow men from eating *imifino* as it emerged during the learners’ and the expert community members’ presentations.



Figure 5.2: The teacher writing feedback from the learners after the presentations

Most of the boys challenged the cultural belief prohibiting boys and men from eating *imifino*. These boys were challenging the cultural stereotypes and such a finding coheres with Roland and Yang (2017) who posit that cultural revolution is likely to have a transformative impact on cultural beliefs. They posit that there is a cultural revolution to change some cultural practices which poses a threat to cultural beliefs and practices.

We also discussed other food groups such as *amaqanda* with protein, *amasi* with protein and *inyama* with protein. Some girls argued that eggs have protein that is needed by our bodies and they see nothing wrong with eating *amaqanda*, *inyama* and *amasi*, yet, those food groups are

forbidden if they follow and respect their cultural beliefs and practices. As I was observing the interactions in class, I noticed that my learners listened attentively and seemed to enjoy and understand the whole class discussion and arguments as espoused by Langenhoven and Stone (2013).

The CAPS document suggests that teachers should encourage learners to use some processing skills in Natural Sciences and Technology. For instance, “the skill number 12 talks about recording information” (DBE, 2011, p. 12). I used the information from the learners and it informed me how to teach the lessons integrating indigenous knowledge (IK) in my future lessons. Kibirige and Van Rooyen (2006) maintain that teachers should develop the ability to integrate IK into their teaching in class to be able to share information.

Firstly, the data from observations, journal reflections, and focus group interviews were colour coded to identify themes (see Appendices I & J). After identifying similarities from the observations, learners’ journals, and focus group interviews, sub-themes were constructed and are presented in Table 5.3. These themes are presented with relevant theory and literature as will be discussed.

Table 5.3: Themes that emerged aligned with theory and literature

Themes	Theory/Literature
Understanding of local or indigenous knowledge by the learners’	Iseke (2013); Kibirige and Van Rooyen (2006); Otulaja and Ogunniyi (2017)
The benefits of integrating local or indigenous knowledge in science class	Aikenhead and Jegede (1999); Chikamori, Tanimura and Ueno (2019); Mhakure and Otulaja (2017); Seehawer (2018b); Mukwambo et al. (2014); Tzou et al 2019.
Challenging cultural stereotypes about forbidden food	Govender (2014); Keane et al. (2016); Hodson (2009); Horsthemke and Schafer (2007); Mesoudi (2009); Ogunniyi (2007a); Ogunniyi and Hewson (2008);

Myths about cultural foods	Chakona and Shackleton (2019); Iradukunda (2020); Novellino (2002); Zepro (2015);;
Shifts in learning	Mavuru and Ramnarain (2017); Mavuru and Ramnarain (2020); Ogunniyi and Hewson (2008)

I now discuss each of these themes in detail below.

5.2.3 Understanding of indigenous knowledge by the learners

It seems that during the presentations by the expert community members my learners were listening carefully and responded well to my questions when I asked them about what had they learnt from the presentations. For instance, L1 commented that:

I understand it from the first presentation by the community member, when she stressed that the girls were not supposed to eat eggs because they will go after boys (L1).

Here the expert community members were presenting about what their parents taught them about cultural beliefs and practices about traditional foods. These teachings were transmitted orally from generation to generation (Kibirige & Van Rooyen, 2006). Agreeing, Smith (2012); Seehawer (2018) and Iseke (2013) highlight that the cultural teachings from the elders are passed to new generations and further generations by means of stories. In the context of this study, these learners came with the IK from their homes and community and combined that with the presentations of expert community members. The expert community members presented some of the cultural beliefs that were controversial and some not understood by learners, yet they learnt from the presentations. In light of this, L2 reflected that “*I learnt very much about my culture*”.

This learner confirmed that he learnt many things he was not aware of before the presentations about his culture. These presentations confirm the power of Ubuntu, as teaching children is not only the responsibility of the home but of the village at large.

5.2.4 The benefits of integrating indigenous knowledge in a science class

This study revealed that there are benefits of integrating indigenous knowledge in science classes as reflected in these learners' comments.

I agree with Sihle that the local knowledge should be integrated in science curriculum. That integration will help us not to eat that was not eaten by our forefathers (L2).

I think that the integration of local knowledge in school science is important and should be included in the curriculum so that those girls eating eggs can learn about the dangers of eating eggs (L1).

I agree that the IK should be integrated in science curriculum because, when we are old as parents, we will also teach our children about these cultural practices (L2).

From these excerpts it could be hypothesised that these learners embraced the integration of indigenous knowledge during science lessons. These findings cohere with Gilbert (2010) who avers that indigenous people have a historical continuity as well as determination to transmit cultural beliefs to future generations of their ancestral territories. Noteworthy is that all three learners highlighted the importance of taking into consideration the past (*retroduction*), the present, and future (*retrodition*) as espoused by Chikamori et al. (2019) (see Section 3.3).

Furthermore, from these excerpts, these learners seemed to support the integration of indigenous knowledge in science classrooms. These findings corroborate with Aikenhead and Jegede's (1999) call that consideration of learners' everyday life worlds have a potential to enable border crossing from home to school.

That resonates with Smith (2012) who posits that the story and the storyteller connect the past with the future, one generation to the other. Concurring, Iseke (2013) and Tzou et al. (2019) accentuate that the *storytelling* that learners possess from their homes and community enable them to understand the past, present, and to focus on the future. Likewise, Chikamori et al. (2019) aver that the present links the past and the future. In addition, these scholars argue that the learner stands between the past and the future learning as evidenced by the reflections from this learner that:

I find that eggs not to be eaten by girls is correct, as I find it important and I can witness this in my local community that girls who eat eggs become fertile and run after boys. Those who do not eat eggs do not go for boys at the early stage (L1).

Some of these learners believed that some of the cultural foods should not be eaten by girls as they have side effects; some of the girls saw this as oppressive and this is akin to Ogunniyi's (2007a) cognitive state. All of the above corroborates with some scholars who suggest that there is a need for the integration of indigenous knowledge into the science classrooms (Aikenhead & Jegede, 1999; Mukwambo et al, 2014; Seehawer, 2018).

All three learners who participated in the focus group interview concurred that indigenous knowledge should be integrated in science lessons. In sum, Aikenhead and Jegede (1999) accentuate that local or indigenous knowledge should be used as a bridge between home and school science. In the context of this study, the learners agreed that the integration between these two worldviews is important in their time. From the above excerpts, it could be deduced that the integration of indigenous knowledge in teaching the topic of nutrition had a positive influence in learners' interest in science.

5.2.5 Learners' challenging cultural stereotypes regarding traditional foods

The expert community members were unwavering when they stressed that cultural beliefs and practices need to be honoured by all people. However, some of the learners did not agree with that and by doing so they were challenging the cultural stereotypes. Ramasubramanian, Winfield, and Riewestahl (2020) accentuate that there is a group of people who can challenge cultural beliefs and mental models of a particular group. In addition, these scholars argue that those challenging cultural beliefs affect expectations and outcomes at the interpersonal level. For example, L1 and L2 commented respectively that "*I did not enjoy about girls that the girls will follow boys if they eat eggs*" and "*I did not enjoy that girls should not eat eggs. I don't agree*".

These learners who are girls showed unhappiness that girls should not eat eggs. They felt that this was favouring males and that girls were suppressed in the process. This finding resonates with Govender (2014) who posits that the dominant view can suppress another view, in this case the cultural beliefs are dominating the health benefits of eating eggs. Accordingly, Ekebas-Turedi, Uk, Basfirinci, and Pinar (2020) maintain that certain food items are associated with a specific gender and that influences their food consumption preferences. Furthermore, food of

a given culture constitutes symbolic meanings including gender. That concurs with what the learners suggested about eating eggs for health reasons.

In that case they need to eat eggs for health reasons but it will not stop them from running after boys (L1).

Here it seems that some of these learners are accommodating these worldviews and agree that once eggs are eaten excessively there will be side effects. These learners suggested that eggs should be eaten for health reasons. That statement coheres with Ogunniyi (2007a) who suggests that these worldviews should not compete but complement each other. In light of this, Ogunniyi (2007a) maintains that these two competing ideas (cultural beliefs) and (health principles), in my case, have equal intellectual force and should coexist. That will see the cultural stereotypes become flexible if we consider, for example, the health implications of eating *imifino* by men.



Figure 5.3: Learner (LM2) asking about men eating *imifino*

Ruxton, Derbyshire, and Gibson (2010) seem to cohere with Ogunniyi (2007a) who suggests that in eggs there is a protein called lysozyme that has an anticancer agent which inhibits tumour formation. In addition, Ngoza (2019) argues about the value of a third space that bridges the open space between IK practices and the scientific knowledge, and also supports that these two worldviews should not compete but should instead work together. That means both these worldviews need to complement each other, for example, they can be allowed to eat *amaqanda* but need to be aware about the side effects of eating it. That is what was suggested

by L5 to avoid unnecessary tensions in class that “I *don't enjoy that men should not eat imifino*”.

It seemed that the learners who are boys in this study are against the fact that men should not eat *imifino*. They thus suggested that because of its health benefits *imifino* should be eaten by everybody, as there is no scientific evidence that men will be weak if they eat *imifino*. Kepe (2008) is against the idea of men not eating *imifino* arguing that it is rich in proteins, iron, and antioxidants. These findings have affinity to Chakona and Shackleton's (2019) argument that there is no known scientific basis to substantiate that belief. According to Graziani et al. (2020), the study conducted in Italy among pre-scholars concluded that both boys and girls do not manifest awareness of food gender stereotypes at an early age.

This suggests that because of the health benefits, *imifino* should be eaten by both men and women. For instance, L4 and L7 said that men should be allowed to eat *imifino* just like their mothers and they also cited nutrition and health reasons that are good for all, including men – Ogunniyi (2007a) refers to this as an emergent cognitive state. It also emerged that cultural beliefs might contrast with science and this caused cognitive dissonance (Le Grange, 2007) amongst the learners. Those learners who did not agree on the above argued that all people should be treated the same irrespective of their gender. They also believed that all must benefit from the nutritious value associated with eating *amaqanda* and *imifino*.

This suggests that some cultural stereotypes should be challenged. Cimi (2009) argues that *imifino* contains more nutrients than the vegetables we buy from the shops. In light of this, L3 commented that “*You will lack vitamins and proteins because you are not eating eggs and imifino*” – this is an equipollent cognitive state according to Ogunniyi (2007a) who suggests that these two worldviews can co-exist.

These learners seemed to concur with Ogunniyi (2007a) who argues that indigenous knowledge should not be romanticised. For instance, these learners did not accept everything presented to them about cultural beliefs and practices.

Some scholars concur when they caution against romanticising indigenous knowledge and suggest that any misconceptions that come with indigenous knowledge should be corrected and identified (Keane et al., 2016; Mhakure & Otulaja, 2017; Mukwambo et al., 2014). For instance, in this study, some learners were not happy to accept that some of the foods are forbidden, such as *amaqanda* and *imifino* that are not to be eaten by girls and men, respectively.

These findings are consistent with Govender (2014) who posits that some learners' IK might be outdated. That is why they like challenging the cultural stereotypes about those food items as they see prohibition of them to a certain group of people as oppression and having their voices suppressed.

5.2.6 Some 'myths' about traditional foods

Some of the cultural beliefs and practices seem to be against the eating of some of the traditional foods by citing some negative implications. Some of these cultural beliefs were regarded as 'myths' since there is no scientific evidence and they need to be proven beyond any reasonable doubt. For instance, Nomalanga presented that women should stay away from drinking *amasi* during menstruation. The fact is, these 'myths' need to be proven scientifically, as they will be myths until proven otherwise, however, we should be careful to use scientific standards to criticise indigenous knowledge. LF1 posed the following question:

Is it true to that when you are pregnant do not eat bone marrow (umongo) you will give birth to the child who will have umfinya (a running nose)? (L1).

Both the expert community members agreed about the statement above and they said that they received that from their parents (Aikenhead & Jegede, 1999). This 'myth' resonates with Zepro (2015) who argues that pregnant women in developing countries are obligated to avoid specific foods due to cultural beliefs. For instance, this scholar accentuates that in Ethiopia, pregnant women are forbidden all foods with a white colour such as milk and fatty meat. Those foods are believed to stick onto the body of the newly born baby.

LF2 believed that if you are suffering from stomach ulcers you should stay away from drinking *amasi* as it will make them worse as *amasi* is acidic. However, the indigenous people give their children *intloya* (whey) from *amasi* to drink when they are having stomach difficulties.

I advised my father not to eat imifino after the presentations by the community members and he agreed, he has not eaten imifino ever since (L2).

Men should be allowed to eat imifino just like women (L4, L7).

I enjoyed that men are not supposed to eat imifino, they will be nyenyenye (L10).

According to Ogunniyi's (2007a) dominant cognitive state, it is a powerful idea that explains the facts that resonate with an acceptable social norm. That is, a dominant cultural state that is used by cultural stereotypes favours the cultural beliefs at the expense of health benefits found

in *imifino*. This view discourages men from eating *imifino* and most men accept it, so that they will be accepted in the community, but this comes at the expense of health benefits.

LF3 was advised that there is nothing wrong in eating *imifino* and her father should continue eating *imifino* for health benefits and this is akin to Ogunniyi's (2007) emergent cognitive state. This view emerged as it was acquired and learnt from school science (Govender, 2014; Ogunniyi & Hewson, 2008). In the end, this particular learner, after she was convinced, went to her father and told him that there is nothing wrong with eating *imifino*.

According to Iradukunda (2020), prohibited food are also called food taboos where not eating them is perceived as a protection, among other things the health of the mother and unborn child. Furthermore, he confirmed that in Ghana, meat is prohibited because it is perceived that the foetus will be big and hence cause difficulty during delivery.

My learners maintained that girls eating eggs would get pregnant is a 'myth' and there is no scientific evidence to prove it. Another 'myth' is that the green leafy vegetables will be attached to the foetus head and cause harm or death (Iradukunda, 2020).

These learners' responses suggested that they enjoyed the lesson and that improvements are needed in some aspects on stories about cultural beliefs and practices. An equipollent cognitive state according to Ogunniyi (2007a) was seen when they cited that men should be allowed to eat *imifino* and women allowed to eat *amaqanda* and *amasi*. Such findings cohere with Govender (2014) who suggests that there should be a balance and equilibrium and coexistence between suppressed (IK) and dominant (western science about food and nutrients). In addition, by adding other cultural foods, they believe that it will improve the lessons, as well as learners' IK going forward.

5.2.7 Shifts in learning

There were learners who strongly believed in cultural beliefs and practices that talk about *imifino*, *amaqanda* and *inyama* and this is how they reflected: "I enjoy that men should not eat *imifino* as they will be *nyenyeny* (weak among men)" (L3, L10 & L12). "Girls eating *amaqanda* have many chances of being pregnant (L11) and "Youth not to eat inside meat" (L6).

After the presentations by the expert community members, some learners took a stand and held on to their cultural beliefs and practices that were presented about *imifino*, *amaqanda* and *inyama*. There was an assimilated cognitive state when they suggested that there are many chances of falling pregnant if girls eat *amaqanda*. According to Ogunniyi and Hewson (2008), the less powerful idea in my case (health benefits) and the dominant one (IK) should complement each other rather than compete with each other. Some of these learners argued that they will keep these cultural beliefs and practices about food. In addition, almost all the learners believed that women who are menstruating should not drink *amasi* as it will prolong the menstrual time.

When women are on menstruation period, they must not drink amasi as it will prolong it (L2, L3, L5, L12).

From this excerpt, the cultural belief about drinking of *amasi* during menstruation forces women to have no choice but to stay away from *amasi* during that particular time. Regarding eating of *imifino* by men, LF3 advised her father not to eat *imifino* after the presentations by the expert community members and he agreed and had not eaten *imifino* until the focus group interview. However, after the focus group interview, she realised that there is nothing wrong in eating *imifino* as they have health benefits. She reported to me that she went back to her father and told him to eat *imifino*. This is an example of a shift that also shows the importance of taking science to and from the community. The findings corroborates with Mavuru and Ramnarian (2020) who argue that if learning is related to learners' socio-cultural setting, learners will be interested and relate to what they know.

5.3 Chapter Summary

In this chapter, I analysed, presented, and discussed the data generated from the lesson observations, focus group interview, and learners' journal reflections. These data gathering techniques were used to answer my third research question in this study. In the next chapter, I present the summary of the findings, recommendations and conclusion.

CHAPTER SIX: SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION

6.1 Introduction

In the previous chapter, I presented, analysed, and discussed data generated from lesson observations, the focus group interview, and learners' journal reflections. The three data gathering methods were used for triangulation purposes.

In this chapter, I thus present a summary of my findings and provide some recommendations thereof. I also suggest areas for future research. The limitations of this study as well as my personal reflections are also presented. The chapter is wrapped up with the overall conclusion of the study.

6.2 Overview of the Study

The main goal of my study was to explore mobilisation of stories about cultural beliefs and practices on traditional foods to contextualise the learning of nutrition in a Grade 6 Natural Sciences township class.

To achieve this goal, the following research questions were addressed:

1. What kind of stories about cultural beliefs and practices on traditional foods such as *amasi*, *imifino*, *amaqanda* and *inyama* do Grade 6 learners know from their homes and the community?
2. How do the Grade 6 learners interact, argue, participate and learn (or not) during the presentations by the expert community members on stories about cultural beliefs and practices on traditional foods such as *amasi*, *imifino*, *amaqanda* and *inyama*?
3. How do Grade 6 learners' conceptions, dispositions and interest shift/evolve (or not) as a result of the presentations by the expert community members on stories about cultural

beliefs and practices on traditional foods such as *amasi*, *imifino*, *amaqanda* and *inyama* as well as lessons on nutrition that integrate indigenous knowledge?

To answer the research questions above, I used four data gathering techniques, namely, group activity, observations, focus group interview, and journal reflections. For research question one, for instance, I used a group activity and newsprints written by the learners in order to get the stories from their homes and the community on cultural beliefs and practices about traditional foods such as, *imifino*, *amasi*, *amaqanda* and *inyama*. Such information was important for this study as it afforded me an opportunity to know what these learners' prior (everyday) knowledge was, as emphasised by Kuhlana (2011) and Metaj-Macula and Bytyqi-Damoni, (2020). Metaj-Macula and Bytyqi-Damoni (2020) posit that prior knowledge plays a significant and active role in construction of new knowledge.

For research question two, I organised two expert community members to make presentations on stories on cultural beliefs and practices about traditional foods such *imifino*, *amasi*, *amaqanda* and *inyama* in my class. The rationale for this was to tap into the cultural heritage or funds of knowledge of community members as they are custodians of this. The data generated from these presentations afforded me an opportunity to obtain in-depth data regarding stories on cultural beliefs and practices about traditional foods.

The data generated from research questions one and two were presented, analysed, and discussed in Chapter Four of this thesis. On the other hand, data from lesson observations, the focus group interview, and journal reflections were presented in Chapter Five. I now discuss the summary of my findings below.

6.3 Summary of Findings

I present the summary of my findings in relation to each research question as shown below. I start with research question one as follows:

6.3.1 Research Question One

What kind of stories about cultural beliefs and practices on traditional foods such as amasi, imifino, amaqanda and inyama do Grade 6 learners know from their homes and the community?

The data revealed that women during menstruation should not drink *amasi* as it is believed that it will make it worse by prolonging it. Additionally, the chances of miscarriage in pregnant women would be higher if they drink *amasi*. There was agreement in the class when the *Amasi* group argued that women who are pregnant should avoid drinking *amasi* as that could contribute to miscarriage. This finding has affinity to Zepro's (2015) assertion that pregnant women should avoid drinking milk during the first and third trimester of pregnancy. In addition, Zepro (2015) accentuates that in Ethiopia pregnant women are forbidden to all foods with white colour such as milk and fatty meat. This scholar believes that milk has negative side effects for pregnant women during the first and third trimester and can lead to miscarriage. In addition, the cultural beliefs and practices also advise that women not drink *amasi* during menstruation as it would prolong the menstrual period. Some learners found relevance with science that drinking *amasi* during menstruation can prolong the menstrual period but there is no scientific evidence linking drinking *amasi* during pregnancy and miscarriage.

Some girls lamented that the cultural beliefs that do not allow girls to eat *amaqanda* are oppressive. For instance, LF2 reflected that “*if it is only directed to girls, what about boys?*” On the other hand, boys had an opposite view and seemed comfortable about girls not eating eggs. For instance, LM4 commented that “*amantombazana mabalulamele ilizwi labadala angabuzi imibuzo*” (girls should respect the word of the old and stop asking questions). According to elderly people in the community, there is a cultural belief that if we keep on asking questions and doubting our cultural beliefs and practices, it can provoke our ancestors. That resonates well with (Leape et al., 2012) who argue that indigenous people need to respect their ancestors by obeying their cultural beliefs and practices.

The *Imifino* group's presentation that men should not eat *imifino* provoked arguments and divided the class into two opposite views based on gender. Most boys were against the cultural belief that men should not eat *imifino* because they would be weak. For example, LM3 stressed that “*Andivumi ukuba amadoda mabangayityi imifino kuba ukutya imifino kuyimpilo yomntu wonke*” (I am against the belief that men are not allowed to eat *imifino*, because eating *imifino* is healthy for everyone). In contrast, most of the girls were in support of the belief that allow only women to eat *imifino*. These findings seemed to cohere with Cimi (2009) and Kutu and Magongwa (2017) who suggest that traditional leafy vegetables represent important food culture and nutritional sources for rural women.

The *Inyama* group came with a traditional story that when a cow is slaughtered different meat is given to different people. For example, the neck as well as the *amacongwane* (steak) are given to boys and some inside meat like intestines given to older people. The above happens in the traditional black communities. LF4 from the coloured community disagreed with that saying: “*In our situation if the cow is slaughtered every person can eat a meat of his choice without discrimination*”. This showed the multi-cultural diversity in my class which stimulated much class discussion. This is consistent with Galczynski, Tsagkaraki, and Ghosh (2011) who argue that the focus of multicultural education should be on learners who are ethnically and racially different from the dominant group and to address cultural differences.

This study also revealed that there are more cultural practices with *amasi* and *inyama* than with *amaqanda* and *imifino* and that suggests that some cultural knowledge about *amaqanda* and *imifino* might be getting lost among new generations. Notwithstanding, this is congruent with Mesoudi’s (2009) comments that culture is not static but evolves. That is why some of the cultural beliefs are lost over time from generation to generation.

6.3.2 Research Question 2

How do the Grade 6 learners interact, argue, participate and learn (or not) during the presentations by the expert community members on stories about cultural beliefs and practices on traditional foods such as amasi, imifino, amaqanda and inyama?

When the expert community members were presenting about the fact that *amasi* should not be eaten by women during their menstrual periods, the learners seemed to understand that and had no problem. However, LF2 interacted with Nomalanga and asked a question:

Ngaphandle kokwandisa ukuba sexesheni kwakho kwakho ingaba zikhona ezinye iingozi zokusela amasi? (Without prolonging your menstruation are there any other dangers you may see yourself in?)

Initially, Nomalanga seemed to be reluctant to give a straight answer because the learner was still too young to understand, but she answered that there are dangers but that they will understand them when they are old enough. Some of the dangers she told me aside, is that a woman drinking *amasi* will fall pregnant easily. About the cultural belief that *amasi* should not be eaten by a newly married woman (*umakoti*) until after her family has brought gifts to the husband’s home (*umembeso*), Nokwakha asked that “*Ngowuphi apha kuni owaka wambona umakoti esela amasi?*” (Is there anyone who has seen a married woman drinking sour milk?). Most of the learners answered that they have not seen them drinking sour milk. Nokwakha

argued that it is because that they are respecting our cultural beliefs by not drinking *amasi* until they are officially allowed to do so.

LM4 raised his hand and contributed that “*Ndakhe ndambona owam umama otshatileyo esela amasi*” (I have seen my mother who is a married woman drinking *amasi*). Nokwakha suggested that it might be after the bride’s family had brought gifts to the husband’s home and some traditional rituals were performed (*utsiki*). The above social interaction revealed that there was positive interaction between the expert community members and the learners as they used *isiXhosa* language which is their mother tongue (Diwu & Ogunniyi, 2012; Msimanga & Lelliot, 2014; Mavuru & Ramnarain, 2020). This is in line with Vygotsky (1978) who argues that language plays an important role in mediating of learning.

Both expert community members agreed that men should not eat *imifino* as they will be weak and always tired. Some boys did not agree with that cultural belief. For example, LM3 argued that “*Ngenxa yokutya okusempilweni ndicinga bonke abantu mabavunyelwe batye imifino oko kuquka namadoda*” (For a nutritious value point of view all people should be allowed to eat *imifino* including men). This coheres with Ogunniyi’s (2007a) equipollent cognitive state. Such a finding also corroborates with Njume, Goduka, and George (2014) that *imifino* forms part of a healthy diet in South Africa.

I observed some smiles on the faces of the boys in the class. Our cultural beliefs allow only women to eat *imifino* and a man will be a laughingstock should he eat *imifino*. This is attested to by the comment made by Chilisa and Ntseane (2010) who argue that women are resisting the gender order which comes with cultural ideologies. These scholars in a research conducted in Botswana concluded that some women are resisting what they call oppression of women by African culture where it states that women are inferior than men. It seems that cultural stereotypes can be challenged as times change.

Learners argued with Nomalanga about why *amaqanda* were not allowed to be eaten by youths. Some learners lamented that the cultural belief is oppressive. LF3, for instance, indicated that she was puzzled why youths are not allowed to eat eggs yet they are nutritious and needed by the body which is an equipollent cognitive state according to Ogunniyi (2007a). Nomalanga explained that *amaqanda* can stimulate sex hormones in the youth resulting in them engaging in sex at a young age, and that can result in unwanted pregnancies. This finding has affinity to Iradukunda (2020) who argues that, for example, eggs are prohibited in Ghana by some tribes

or cultural groups but recommended by others. In the context of this study, the expert community members were biased and favoured the prohibition of eggs for women. In contrast, Ekebas-Turedi et al (2020) maintains that in a study conducted in America and Turkey it concluded that females seem to be willing to consume masculine perceived foods like eggs and meat.

Notwithstanding these arguments, at the end of the day many learners did not agree that youths should not eat *amaqanda* but a few agreed with that cultural belief. For example, LF1 pointed out that that youths and girls in particular should not eat eggs, “*Amantombazana mabangawaty i amaqanda kuba ndiyakholelwa ukuba xa bewatya bazakulandela amakhwenkwe, lonto ndiyayibona iyenzeka*” (Girls should not eat eggs because I believe that should they do so they will go after boys, that is happening I am witnessing it in the community). In the context of this study, for instance, I noticed that some of my learners who were less talkative in my past lessons argued for and against the integration of IK in school science.

Both expert community members agreed that there are certain types of meat that should not be eaten by the youth and women such as inside meat (intestines) and more. They were in agreement that the inside meat can stimulate the sex hormones and that is the reason for youths not to eat it. Learners interacted with the presenters, for example, LF3 argued that “*Meat is having some proteins that are needed by the boys and I don’t know why our culture banned us from eating meat of our choice*”. Nomalanga argued that they were told by their parents and in those days they were not allowed to ask some questions like the children of today. Some learners seemed to not be convinced with that answer.

For instance, LF4 from the coloured community interjected and argued that “*I disagree that a certain meat must be attached to a certain group of people, in my culture a person can eat a meat of his or her choice*”. Nomalanga seemed as if she was upset when she said that “*Lonto inxamnye nenkcubeko yethu xa usitya nayiphina inyama oyinqwenelayo, lonto ayamkelekanga kwaye ibonwa nje ngendelelo kwinkcubeko yethu*” (You are against our culture if you eat meat of your own, that is not allowed and that is disrespectful). I quickly intervened saying that that is not disrespectful as we come from different cultures and they need to complement each other rather than compete with each other. That resonates well with (Ngcoza (2019) and Ogunniyi (2007a) who argue that a third space should be used well so that the dominant and the so called inferior cultures can complement one another. In this study, I also witnessed the uniqueness of my learners as they come from multicultural communities.

6.3.3 Research Question 3

How do Grade 6 learners' conceptions, dispositions and interest shift/evolve (or not) as a result of the presentations by the expert community members on stories about cultural beliefs and practices on traditional foods such as amasi, imifino, amaqanda and inyama as well as the lessons on nutrition that integrate local or indigenous knowledge?

Learners reflected that:

I did not enjoy the part that girls should not eat amaqanda, I don't agree (L2, L9, L10, L12).

I did not enjoy the part that girls will follow boys if they eat amaqanda (L1).

Men should be allowed to eat imifino just like women (L4, L7).

The above excerpts exemplify that for some boys and girls there was no shift in learning from the cultural beliefs and practices presentations, as they argued that girls should eat *amaqanda* and men eat *imifino* from a nutritional point of view. Congruent to the findings of this study is Taleni and Goduka (2013) who found that indigenous leafy vegetables (ILVs) such as *imifino* are significant sources of medicine that can strengthen the immune system.

The cultural beliefs and practices stipulate that men should not be allowed to eat *imifino* as they will be seen as weak among other men who do not eat *imifino*. That agrees with Chilisa and Ntseane (2010) who argue that in a research in Botswana, the Setswana culture believes that men who associate with women are weak. These learners did not agree with this and argued that all people must be treated the same irrespective of their gender.

In addition, almost all the learners believed that women who are on their menstruation should not drink *amasi* as it will prolong the menstrual time.

When women are on menstruation period, they must not drink amasi as it will prolong it (L2, L3, L5, L11, L12).

L3 indicated that she advised her father not to eat *imifino* after the presentations by the expert community members and he agreed and stopped eating them until after the focus group interview, when he continued to eat *imifino* because of their health benefits. The above suggested that there was a shift in the learner's beliefs as before the lesson and presentations she saw nothing wrong with the father eating *imifino* until the lesson and the presentations from the two expert community members. These findings have affinity with Mavuru and

Ramnarian's (2020) findings, who argue that if learning is related to cultural settings, learners will be interested and relate it to what they know.

6.4 Recommendations

Based on the findings above, I recommend that the community should conserve stories on cultural beliefs about traditional foods. The parents should teach their children about cultural beliefs and practices so that they come to school with such rich cultural capital from home (Aikenhead & Jegede, 1999; Mateus & Ngcoza, 2019). Likewise, teachers should create a space that is nonthreatening and that will allow learners to participate (Sedlacek & Sedova, 2017) and argue for their point of view to be able to learn from others (Diwu & Ogunniyi, 2012).

I also recommend that expert community members should be invited to share their cultural heritage or funds of knowledge with learners at school. In light of this, Smith (2012, p. 105) avers that:

Sharing is a good thing to do, it is a very human quality. To be able to share, to have something worth sharing gives dignity to the giver. To accept a gift and to reciprocate gives dignity to the receiver. To create something new through that process of sharing is to recreate the old, to reconnect relationships and to recreate our humanness.

From this quote, there should be a positive rapport between the school and the expert community members to facilitate a good partnership with these custodians of indigenous knowledge. For instance, when I asked the two expert community members how they found the experience of sharing their wisdom with our learners and us, they commented that: "*Singafundanga sinje kutheni usikhathalela nje sifundise abantwana esikolweni*" (Uneducated as we why are you find value in us to teach learners at school). I noticed on Nokwakha's face that she was so grateful and honoured to be afforded an opportunity to present to the learners.

In light of this, the teachers should not impose their cultural beliefs on the learners but instead should be impartial and accommodate all learners from diverse socio-cultural backgrounds in multicultural classrooms as espoused by scholars such as Breidlid (2009) and Mavuru and Ramnarain (2020).

Research question three explored how the learners' conceptions, dispositions, and interests shifted (or not) as a result of presentations by expert community members on stories about cultural beliefs and practices on traditional foods as well as the lessons on nutrition that

integrated IK. In light of this, I therefore recommend that the DBE should empower science teachers on how to enact culturally sensitive pedagogies as espoused by Mhakure and Otulaja (2017) and other scholars, so that they are able to value the cultural capital of the learners. I believe that this could be achieved if policy formulators and textbook writers treat indigenous knowledge and westernised science as equal and as complementing each other rather than as competitors (Ogunniyi, 2007a).

That might capacitate the teachers on how to integrate IK when teaching their science lessons (Aikenhead & Jegede, 1999; Mhakure & Otulaja, 2017; Mukwambo, Ngcoza, & Chikunda, 2014).

6.5 Areas of Further Research

The use of Ogunniyi's (2007a) Dialogic Argumentative Instructional Model (DAIM) in research needs to be considered for future research as it encouraged argumentation among learners in this study. Therefore, DAIM has a potential to foster argumentation among learners from township or rural schools.

Further research in the field of Natural Sciences could be done on how minority groups in multicultural classrooms can have their *voices* heard. Some minority groups might feel that their voices are intimidated or suppressed (Ogunniyi, 2007a) by the majority group when transmitting their IK. Yet, their voices count and therefore need to be heard in science classrooms. In the context of this study, I have LF4 in mind from a coloured community which is a minority group in my class, and that indeed, her *voice* needed to be heard. This learner contributed to the discussions, after she was shy to express her views at the beginning, as I embraced her and motivated her to raise her voice.

A further interventionist study could be conducted with science teachers on how to co-develop exemplar lessons on nutrition that integrate stories on cultural beliefs and practices on traditional foods to mediate learning of science lessons.

6.6 Limitations to the Study

This case study was conducted with a Grade 6 class from Mdoko Primary school (pseudonym) consisting of about 34 learners in the Amathole West education district. Therefore, the sample was small and cannot be generalised as representing all learners of the Amathole West or the

province at large. Nonetheless, the knowledge and insights from this case study might be helpful in other contexts.

Although the use of mother tongue in this study played a significant role as reiterated by some scholars such as Diwu and Ogunniyi (2012), Mavuru & Ramnarian (2020) and Msimanga and Lelliot (2014), I am mindful of the fact that in the process of translating from *isiXhosa* into English some of the information could have been lost or distorted. Nonetheless, Nomzamo was used to counteract that by doing quality assurance on the transcripts of the focus group interview and presentations of the expert community members.

6.7 My Personal Reflections

As alluded to earlier, in 2015 I was involved in an Indigenous Knowledge (IK) project coordinated by a researcher from Norway who was doing her PhD project at Grahamstown primary and secondary schools. During this project we met once a week and collaboratively developed and planned some exemplar lessons that integrated IK into our science lessons. The researcher subsequently visited our classes to observe how we mediated learning of the exemplar lessons. During the implementation of such exemplar lessons and to our surprise we found that learners participated actively in the lessons (Sedlacek & Sedova, 2017; Vygotsky, 1978).

My involvement in that project thus triggered my interest to do a similar research on how to integrate IK into my Natural Sciences lessons. By that time, I was completing a Bachelor in Education (BEd) degree with Rhodes University. Since I was a school principal at that time, I decided to register for a Bachelor in Education (honours) with the same institution and as a result of my position at school, I decided to major in Education Leadership and Management (ELM) which unfortunately clashed with Science Education in the timetable.

After I had successfully completed my honours at the end of 2017, I decided to apply to do Masters in ELM but I was rejected because I did not meet the requirements for Masters. I suspect that my results could have been affected by the fact that I am an English second language speaker rather than by my intellectual capacity. Admittedly, English proficiency can be a barrier to most learners and teachers from disadvantaged socio-cultural backgrounds. This is a sad reality we are currently faced with in South Africa and people are marginalised as a result of this foreign language, English.

Like many, I felt disappointed as I seemed, perhaps at face value, to have a good working relations with the department. For instance, I had been hosting PGCE students from the education department to do teaching practice at my school. Additionally, my co-supervisor was also doing her PhD research project at my school. I also permitted the Whistlestop School to run from my school. Were all these partnerships not adequate enough to influence the rules if we sincerely talked about epistemological access at these former white institutions in South Africa? Could it be that we had different understandings of what is meant by transformation? Would the university standards be lowered if I was accepted to do this course? There were more questions than answers!

Thankfully, Professor Kenneth Mlungisi Ngcoza came to my rescue and accepted me to do a master's in Science Education in 2018 based on my experience of being involved in the research project with the researcher from Norway. In isiXhosa we say "*Ukonakala kwenye, kukulunga kwenye*" (which translates to when something else goes wrong, something else will come right). I found myself immersed in a very supportive community of practice guided by the principles of Ubuntu as alluded to by Smith (2012) and many other scholars. But this was short lived.

Sadly, all the years I was in Grahamstown (now called *Makhanda*) from 2015 until 2018 I staying without my family who are in Queenstown. When the opportunity came for me to go back home and stay with my family, I grabbed it with both hands. Just six months after I had enrolled for the MEd course, I had to relocate to a school in the Queenstown (now called *Komani*) area and re-united with my wife and my 5-year-old boy whom I left when he was 2 years old. One on hand, this was a big relief for as I had two homes which I found to hard to manage. On the other hand, the distance between my supervisors and colleagues widened. In consequence, after I had left Grahamstown my studies suffered a lot as I missed the Rhodes University library and my community of practice that had kept me going.

I lagged behind other master's scholars who all submitted their research proposals in November 2018. To add salt to the wound, I was a victim of the transition in ethics at Rhodes University as all of a sudden doing research *with* or *on* learners was perceived as high risk even though I felt I wanted to improve my practice. Such an experience left a bitter taste in my mouth and supervisors' alike. The experience was also quite costly as in addition to looking after my family I was paying for my education. It never rains but it pours!

My study dragged on to 2020, the year of the COVID-19 pandemic and lockdown. Everything came to a standstill globally with many people dying especially those with comorbidities. I also lost my beloved mother and my hopes and dreams were shattered completely and two members of my family who succumbed due to COVID-19. During this period, we lost almost six months of schooling and that halted my data gathering since the learners, teachers, and as well as expert community members were having to follow COVID-19 health protocols for the first time which consisted of wearing face masks, sanitising, and social distancing among others.

According to Mwambari (2020), COVID-19 is an unprecedented historical dilemma for mankind and many feared for the future. Although COVID-19 does not discriminate who it affects, it has exposed many inequalities between the haves and the have nots. It also exposed the lies that Africa is the continent of death and disease, as at the time of writing this, the East was suffering even more than those in Africa due to the pandemic.

On a positive note, however, Mwambari (2020) argues that this pandemic presents an opportunity for Africa to try find solutions to complex problems like COVID-19. This scholar seems to challenge the lies that there is nothing good that can come from Africa, arguing that these are Afro pessimists. Resultantly, he avers that African countries should be allowed to use their local expertise and eventually export it out of Africa. At the time of writing this, it seemed that Africa had a solution from Madagascar with one of its indigenous plants, but that the West was refusing to recognise it.

Thankfully, I was blessed to have caring and motivating supervisors, Prof. Kenneth Ngcoza and Dr Zukiswa Nhase as well as my colleagues in my great community of practice (CoP). We motivated and supported one another through sharing everything that would develop us academically and professionally. I am therefore indebted to my supervisors and colleagues who were helpful to me in this journey. I am where am I today because of their selfless efforts and Ubuntu that made it possible for me to complete my studies. One of the milestones was presenting my research at the Provincial Colloquium held at Rhodes University in 2018. Had it not been for them, I would have given up.

I am also thankful to my critical friend who was with me throughout this journey and advised me how to make these group activities learner centred so that social interactions could take place among learners as proposed by Vygotsky (1978).

I cannot forget to thank the two expert community members who agreed to come to my class and present stories about cultural beliefs and practices on traditional foods. Notably, learning *with* my learners was such a refreshing experience and I will treasure that for the rest of my life. They shared the knowledge they received from their parents as is emphasised by Kibirige and Van Rooyen (2006). Moreover, this study presented me with an opportunity to work and collaborate *with* colleagues in South Africa, Namibia, and Zimbabwe and I hope that such collaborations will extended to future studies and research projects.

6.8 Conclusion

The main goal of this study was to explore mobilisation of stories about cultural beliefs and practices on traditional foods to contextualise the learning of nutrition in a Grade 6 Natural Sciences township class. To achieve this goal, I used the following data gathering techniques: a group activity, observations, focus group interview, and journal reflections. The findings from this study confirmed that there are cultural beliefs and practices that can be integrated into the topic of nutrition in Grade 6 class. It also revealed that there are more cultural beliefs and practices about *amasi* and *inyama* than *amaqanda* and *imifino*. Secondly, the use of DAIM enabled learners to participate actively, argue, and freely ask questions during the group presentations as well as during the presentations by the expert community members.

Thirdly, the study aimed at finding out how lessons on nutrition that integrate IK shifted (or not) Grade 6 learners' conceptions, dispositions, and interest as a result of presentations by expert community members. The findings revealed that most learners were positively influenced by integrating indigenous knowledge in the topic on some food items. However, there was a small group of three learners from the coloured area who were not convinced about some cultural beliefs and practices about *inyama* and *amaqanda* in particular. Notably, however, their voices were heard in this regard. The study thus recommends that there is a need for science teachers to consider learners' socio-cultural background as reiterated by Mavuru and Ramnarain (2020). In conclusion, the main findings of the study revealed that the integration of indigenous practices and science when teaching the topic of nutrition in a township Grade 6 science class has the potential to foster argumentation. That is, the social interactions among the learners made it possible for them to argue in class using CAT and DAIM. In addition, the involvement of expert community members in the class created a relaxed atmosphere for both learners and teachers (critical friend and myself).

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APPENDICES

Appendix A: Ethics clearance letter



Human Ethics subcommittee
Rhodes University Ethical Standards Committee
PO Box 94, Grahamstown, 6140, South Africa
t +27 (0) 46 603 8055
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e: ethics-committee@ru.ac.za
www.ru.ac.za/research/research/ethics
NHREC Registration no. REC-241114-043

22 June 2020

Sipho Nuntsu

Email: g13N8245@campus.ru.ac.za

Review Reference: 2020-0796-3392

Dear Prof Ngcoza

Title: Mobilising stories about cultural beliefs and practices about food in grade 6 natural sciences class

Principal Investigator: Prof Kenneth Mlungisi Ngcoza

Collaborators: Mr. Sipho Nimrod Nuntsu, Ms. Zukiswa Ntase

This letter confirms that the above research proposal has been reviewed and APPROVED by the Rhodes University Ethical Standards Committee (RUESC) – Human Ethics (HE) sub-committee.

Approval has been granted for 1 year. An annual progress report will be required in order to renew approval for an additional period. You will receive an email notifying when the annual report is due.

Please ensure that the ethical standards committee is notified should any substantive change(s) be made, for whatever reason, during the research process. This includes changes in investigators. Please also ensure that a brief report is submitted to the ethics committee on the completion of the research. The purpose of this report is to indicate whether the research was conducted successfully, if any aspects could not be completed, or if any problems arose that the ethical standards committee should be aware of. If a thesis or dissertation arising from this research is submitted to the library's electronic theses and dissertations (ETD) repository, please notify the committee of the date of submission and/or any reference or cataloging number allocated.

Sincerely,

Prof Arthur Webb

Chair: Human Ethics Sub-Committee, RUESC- HE

Appendix B1: Letter To The District Director, Department Of Education

The District Director

Amathole West District

Eastern Cape Department of Education

Private Bag X2041

Fort Beaufort

Dear Madam

**Re: Request for permission to conduct educational research with Grade 6 learners at
XXXX Primary School in Amathole West District**

I am Sipho Nimrod Nuntsu (Student number: 13N8245), a part-time student doing Masters in Science Education at Rhodes University, South Africa. I am a School Principal and a Mathematics and Natural Sciences teacher at XXXX Primary School in the Amathole West District. I hereby humbly request your permission to conduct a research study with learners at XXXX Primary which is in your District. The study will explore mobilizing stories about cultural beliefs and practices on traditional foods with a view to contextualize and enhance learning of the topic of nutrition and 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 three 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 6 Natural Sciences teacher to observe the three community leaders who will tell the stories about cultural beliefs and practices about nutrition. I plan to conduct the study in July 2020.

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 participants and their views will be treated with high degree of confidentiality and anonymity.

I can be reached at 073 988 0693 or email (siphology7@gmail.com)

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

My co-supervisor is Ms Zukiswa Nhase at(z.kuhlane@ru.ac.za).

The Rhodes University Ethics coordinator is Mr Siyabonga Manqele, email address (s.manqele@ru.ac.za)

Your consideration will be highly appreciated in this regard.

Yours Sincerely

Nuntsu SN

Appendix B2: Letter To The Head Of Department (Hod) Of Xxx Primary

The Head of Department (HoD)

XXXX Primary

Stutterheim CMC

Amathole West District

Dear Madam

**Re: Request for permission to conduct educational research with Grade 6 learners at
XXXX Primary School in Amathole West District**

I am Sipho Nimrod Nuntsu (Student number: 13N8245), a part-time student doing Masters in Science Education at Rhodes University, South Africa. I am a School Principal and a Mathematics and Natural Sciences teacher at Cathcart (RC) Primary School in the Amathole West District. I hereby humbly request your permission to conduct a research study with learners at XXXX Primary which is in your District. The study will explore mobilizing stories about cultural beliefs and practices on traditional foods with a view to contextualize and enhance learning of the topic of nutrition and 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 three 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 6 Natural Sciences teacher to observe the three community leaders who will tell the stories about cultural beliefs and practices about nutrition. I plan to conduct the study in July 2020.

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 participants and their views will be treated with high degree of confidentiality and anonymity.

I can be reached at 073 988 0693 or email (siphology7@gmail.com)

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

My co-supervisor is Ms Zukiswa Nhase at z.kuhlane@ru.ac.za.

The Rhodes University Ethics coordinator is Mr Siyabonga Manqele, email address (s.manqele@ru.ac.za)

Your consideration will be highly appreciated in this regard.

Yours Sincerely

Nuntsu SN

Appendix B3 (A): Letter To The Community Members

Enquiries: Mr Nuntsu SN

Cell number: 073 988 0693

Dear Sir

Re: PERMISSION LETTER: PRESENTATION AT XXXX PRIMARY SCHOOL

I am Siphon Nimrod Nuntsu (Student number: 13N8245), a part-time student doing Masters in Science Education at Rhodes University, South Africa. I am a School Principal and a Mathematics and Natural Sciences teacher at XXXX Primary School in the Amathole West District. 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 learners' at XXXX Primary. The focus of the study is to explore how the integration of local or indigenous knowledge during the lessons on the topic on nutrition influences learners' conceptions, dispositions and interest.

I would like you to make a presentation on stories about cultural beliefs and practices on traditional foods for my Grade 6 Natural Sciences learners. I would like you to write something about those the cultural beliefs and practices about traditional foods. I also ask you to be the part of the interview after the presentation of stories. These presentations will be videotaped. The purpose for this is to contextualize and enhance learning of the topic of nutrition. Informed consent will be sought from the learners and from learners' parents or guardians. I plan to conduct the study for about two weeks in July 2020.

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

I henceforth request you to indicate your choice by making a tick (✓) in an appropriate box below

Agree

Not Agree

Signature: -----

Your cooperation will be highly appreciated in this regard.

Yours Sincerely,

Nuntsu SN

I can be reached at 073 988 0693 or email (siphology7@gmail.com)

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

My co-supervisor is Ms Zukiswa Nhase at z.kuhlane@ru.ac.za.

The Rhodes University Ethics coordinator is Mr Siyabonga Manqele, email address (s.manqele@ru.ac.za)

Appendix B3 (B): Translation

Mnumzana obekekileyo,

Igama lam ngu Siphon Nuntsu umfundisi-ntsapho we Zibalo ne Nzululwazi e XXXX Primary School. Ndicela ukuba uthathe inxaxheba kuphando kwi zifundo zam zakwi Dyunivesithi yase Rhodes. Uphando lwam ndizakulwenza e XXXX Primary School, lunxulumene nokuphanda umdla wabafundi ukuzama ukuphuhlisa kokufundiswa kweNzululwazi kwibanga lesine. Kolu phando ndizakuzama ukudibanisa ulwazi nenkcubeko efumaneka eluntwini nasekuhlaleni jikelele xa kufundiswa iindidi zokutya.

Oluphando luzakuthatha izigaba ezithathu. Sigxile kakhulu ukufundisa nokucacisela abafundi notitshala weNzululwazi ukuba luthinina ulwazi lwemveli ngentlobo zokutya kwakunye neenkolo zakwantu. Injongo ephambili yoluphando kukujonga ukuba kungakwazi na ukuhlanganiswa ulwazi lwemveli neNzululwazi yase Ntshona, ukuzama ukukhulisa umdla wabafundi kwezeNzululwazi. Ndiyazithoba ndikwakucela kanjaqo ukuba uzokusifundisa, ngolwazi lwemveli ngentlobo zokutya kwakunye neenkolo zoluntu ezidibene nokutya.

Ndakuvuyiswa yinxaxheba yakho koluphando. Imithetho ye Dyunivesithi ke ayibopheleli abathathi nxaxheba lonto ithetha ukuba banako ukurhoxa nanini na xa befuna njalo. Ndiyakuqinisekisa nakanjalo ukuba ulwazi olufumaneka koluphando aluyikunikwa 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 kwiintlobo ezithile zokutya kwasekhaya.

Ukuba unombuzo malunga noluphando, nceda utsalele umxeba kum kolu cingo 073 988 0693, siphology7@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 noNkosikazi uZukiswa Nhase, z.kuhlane@ru.ac.za naye okwiSebe lwezeMfundo kwi Dyunivesithi yase Rhodes.

Ncincilili !!!

Ndiyakucela kakanjalo ukuba uncede uzalise esi siqendu silandelayo

Mna Mnumzana (igama lakho)

Ndiyavuma OKANYE Andivumi (Khetha ngokufaka X) ukuthatha inxaxheba koluphando.

Tyikitya

Inombolo yomnxeba

Appendix B4 (A): Letter To The Parents /Guardians

Enquiries: Mr Nuntsu SN

Mobile number: 073 988 0693

Dear Sir / Madam

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 Siphon Nimrod Nuntsu (Student number: 13N8245), a part-time student doing Masters in Science Education at Rhodes University, South Africa. I am a School Principal and a Mathematics and Natural Sciences teacher at XXXX Primary School in the Amathole West District. I hereby humbly request your permission to conduct a research study with learners at XXXX Primary which is in your District. The study will explore mobilizing stories about cultural beliefs and practices on traditional foods with a view to contextualize and enhance learning of the topic of nutrition and 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 three 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 6 Natural Sciences teacher to observe the three community leaders who will tell the stories about cultural beliefs and practices about nutrition. I plan to conduct the study in July 2020.

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 participants and their views will be treated with high degree of confidentiality and anonymity.

If you have any question about the research, please feel free to contact me at 073 988 0693, siphology7@gmail.com or my supervisors Prof. Kenneth M. Ngcoza at k.ngcoza@ru.ac.za and Ms Zukiswa Nhase at z.kuhlane@ru.ac.za.

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 research. I hereby give permission to (name of the child) to participate in this study that will look at cultural beliefs and practices on tradition foods.

Yours sincerely

Nuntsu SN

Appendix B4 (B): Translation

Mzali obekekileyo,

Igama lam ngu Siphon Nuntsu umfundisi-ntsapho we Zibalo ne Nzululwazi e XXXX Primary School. Ndicela ukuba uvumele umntwana wakho ukuba athathe inxaxheba kuphando kwi zifundo zam zakwi Dyunivesithi yase Rhodes. Uphando lwam ndizakulwenza e XXXX Primary School, lunxulumene nokuphanda ukukhulisa umdla wabafundi xa kufundiswa iNzululwazi kwibanga lesine. 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 lwemveli ngentlobo zokutya kwakunye neenkolo zakwantu. Injongo ephambili yoluphando kukujonga ukuba kungakwazi na ukuhlanganiswa ulwazi lwemveli neNzululwazi yase Ntshona, ukuzama ukukhulisa umdla wabafundi kwezeNzululwazi. Ndiyazithoba ndikwakucela kanjaqo ukuba uzokusifundisa, ngolwazi lwemveli ngentlobo zokutya kwakunye neenkolo zoluntu ezidibene nokutya.

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 olufumaneka koluphando aluyikunikwa nabanina ngaphandle kwemvume yakho. Ukanti, igama lakho aliyichazwa 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 ezithile zokutya kwasekhaya.

Ukuba unombuzo malunga noluphando, nceda utsalele umxeba kum kolu cingo 073 988 0693, siphology7@gmail.com, okanye ingqonyela nengqonyelakazi endiphantsi kwazo u Prof.Kenneth M. Ngcoza kulomxeba 046 603 7269, k.ngcoza@ru.ac.za okwiSebe lwezeMfundo kwi Dyunivesithi yase Rhodes, okanye noNkosikazi u Zukiswa Nhase, z.kuhlane@ru.ac.za naye okwiSebe lwezeMfundo kwi Dyunivesithi yase Rhodes.

Ncincilili !!!

Ndiyakucela kananjalo ukuba uncede uzalise esi siqendu silandelayo

Mna mzali okanye ummeli mzali
(igama lakho),ka (Igama lomntwana wakho)

Ndiyavuma OKANYE Andivumi (Khetha ngokufaka X) ukuthatha inxaxheba koluphando.

Tyikitya

Inombolo yomnxeba

Appendix B5 (A): Letter To The Learner

Enquiries: Mr Nuntsu SN

Cell number: 073 988 0693

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 class

I am Siphon Nimrod Nuntsu, a part-time student doing Masters in Science Education at Rhodes University, South Africa. I am Mathematics and Natural Sciences teacher at XXXX Primary. 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 on nutrition. The study will explore mobilizing stories about cultural beliefs and practices on traditional foods with a view to contextualize and enhance learning of the topic of nutrition and 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 three 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 6 Natural Sciences teacher to observe the three community leaders who will tell the stories about cultural beliefs and practices about nutrition. I plan to conduct the study in July 2020.

The focus of the study is to explore learners' conceptions, dispositions and interest when integrating local or indigenous knowledge when teaching the topic on nutrition to the Grade 6 Natural Sciences class. 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 be 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.

If you have any question about the research, please feel free to contact me at 073 988 0693, (siphology7@gmail.com) or my supervisors Prof. Kenneth M. Ngcoza at (k.ngcoza@ru.ac.za) and Ms Zukiswa Nhase at (z.kuhlane@ru.ac.za).

Lastly, if you agree or do not agree to participate in this research, please complete the consent form below.

I (full name of the learner), hereby confirm that I understand the content of this document and the nature of research. I henceforth request you to indicate your choice by making a tick (√) in an appropriate box below.

Agree to participate in the study

Do not wish to participate in the study

Signature: ----- Date :-----

Your cooperation will be highly appreciated in this regard.

Yours sincerely

Nuntsu SN

Appendix B5 (B): Translation

Mfundi obekekileyo (Igama lomfundi)

Igama lam ngu Siphon Nuntsu umfundisi-ntsapho we Zibalo ne Nzululwazi e XXXX Primary School. Ndicela ukuba uvumele umntwana wakho ukuba athathe inxaxheba kuphando kwi zifundo zam zakwi Dyunivesithi yase Rhodes. Uphando lwam ndizakulwenza e XXXX Primary School, lunxulumene nokuphanda ukukhulisa umdla wabafundi xa kufundiswa iNzululwazi kwibanga lesine. 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 lwemveli ngentlobo zokutya kwakunye neenkolo zakwantu. Injongo ephambili yoluphando kukujonga ukuba kungakwazi na ukuhlenganiswa ulwazi lwemveli neNzululwazi yase Ntsona, ukuzama ukukhulisa umdla wabafundi kwezeNzululwazi. Ndiyazithoba ndikwakucela kanjaqo ukuba uzokusifundisa, ngolwazi lwemveli ngentlobo zokutya kwakunye neenkolo zoluntu ezidibene nokutya.

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 olufumaneka 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 abzakufundiswa 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 073 988 0693, (siphology7@gmail.com), okanye ingqonyela nengqonyelakazi endiphantsi kwazo u Prof.Kenneth M. Ngcoza kulomxeba 046 603 7269, (k.ngcoza@ru.ac.za) okwiSebe

IwezeMfundo kwi Dyunivesithi yase Rhodes, okanye noNkosikazi u Zukiswa Nhase, (z.kuhlane@ru.ac.za) naye okwiSebe IwezeMfundo kwi Dyunivesithi yase Rhodes.

Ncincilili !!!

Ndiyakucela kananjalo ukuba uncede uzalise esi siqendu silandelayo

Mna mfundi (igama lakho).

Ndiyavuma OKANYE Andivumi (Khetha ngokufaka X) ukuthatha inxaxheba koluphando.

Tyikitya

Inombolo yomnxeba

Ozithobileyo

Sipho Nuntsu

Appendix B6 : Letter To The Natural Sciences Teacher

Enquiries : Mr Nuntsu SN

Cell number : 073 988 0693

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 Siphon Nimrod Nuntsu (Student number: 13N8245), a part-time student doing Masters in Science Education at Rhodes University, South Africa. I am a School Principal and a Mathematics and Natural Sciences teacher at XXXX Primary School in the Amathole West District. I hereby humbly request your permission to conduct a research study with learners at XXXX Primary which is in your District. The study will explore mobilizing stories about cultural beliefs and practices on traditional foods with a view to contextualize and enhance learning of the topic of nutrition and 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 three 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 6 Natural Sciences teacher to observe the three 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 July 2020.

The focus of the study is to explore the learners' conceptions, dispositions and interest when integrating local or indigenous knowledge when teaching the topic on nutrition to the Grade 6 Natural Sciences class. 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 073 988 0693 or email (siphology7@gmail.com)

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

My co-supervisor is Ms Zukiswa Nhase at z.kuhlane@ru.ac.za.

The Rhodes University Ethics coordinator is Mr Siyabonga Manqele, email address (s.manqele@ru.ac.za)

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.

I (full name of the teacher), hereby confirm that I understand the content of this document and the nature of the research . I henceforth request you to indicate your choice by making a tick (✓) in an appropriate box below.

Agree to participate in the study ,Secondly, I am aware that information about the study must be kept confidential and high level of professionalism is expected from myself.

Do not wish to participate in the study

Signature: ----- Date :-----

Yours Sincerely

Nuntsu SN

Appendix C: Methods and purpose

Table 6: Shows the methods used and the purpose for gathering data

Stage	Method to be used to gather data	Purpose	Research Questions
Stage 1	Group Activity	To establish the <i>stories</i> about cultural beliefs and practices on traditional foods such as ¹¹ <i>amasi</i> , <i>imifino</i> , <i>amaqanda</i> and <i>inyama</i> that Grade 6 learners know from their homes and the community.	1
Stage 2	Presentations by expert community members and participant observation	Expert community members presenting <i>stories</i> about cultural beliefs and practices about <i>amasi</i> , <i>imifino</i> , <i>amaqanda</i> and <i>inyama</i> . The critical friend and I did participatory observation.	2
Stage 3	Consolidation lessons	Consolidation lesson focusing on the science concepts on nutrition that emerged from the presentations by the expert community members.	3
Stage 5	Reflection journals: Learners and Natural Sciences teacher who was a critical friend in this study.	To establish how the Grade 6 learners' conceptions, dispositions and interest towards science shifted/evolved (or not) as a result of the presentations by the expert community members on <i>stories</i> about cultural beliefs and practices on traditional foods such as <i>amasi</i> , <i>imifino</i> , <i>amaqanda</i> and <i>inyama</i> .	2 and 3
Stage 6	Focus Group Interviews	To establish the learners' conceptions dispositions and interest towards science after the intervention.	3

¹¹ *Amasi* is sour milk, *imifino* are made from wild leafy vegetables, *amaqanda* are eggs and *inyama* is meat.

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4. What kind of *stories* about cultural beliefs and practices on traditional foods such as ¹²*amasi*, *imifino*, *amaqanda* and *inyama* do Grade 6 learners know from their homes and the community?

5. How do the Grade 6 learners interact, argue, participate and learn (or not) during the presentations by the expert community members on *stories* about cultural beliefs and practices on traditional foods such as *amasi*, *imifino*, *amaqanda* and *inyama*?

6. How do Grade 6 learners' conceptions, dispositions and interest towards science shift/evolve (or not) as a result of the presentations by the expert community members on *stories* about cultural beliefs and practices on traditional foods such as *amasi*, *imifino*, *amaqanda* and *inyama*?

¹² *Amasi* is sour milk, *imifino* are made from wild leafy vegetables, *amaqanda* are eggs and *inyama* is meat.

Appendix D: Focus Group Interview Schedule

1. What do you understand by the term local knowledge?
2. What are your views on the inclusion of local knowledge in science lessons?
3. What local knowledge do you think would be important for learners to learn nutrition?
4. What do you think what could be the **benefits** of including local knowledge in teaching the topic of nutrition?
5. What do you think could be the **challenges** for including local knowledge in teaching the topic of nutrition?
6. What else would you like to share with me regarding the inclusion of local knowledge in science lessons?

Appendix E: Analytical Framework

Table 2: Analytical framework (Adapted from Atallah et al., 2010, p.48)

KEY CONCEPT	CONCEPTUAL FRAMEWORKS	RELATED PRACTICES (THE INDICATORS)
Integration of IK	CONCEPTIONS	C1. Describing what is the purpose of learning science.
		C2. Describing what they believe is required to learn science.
		C3. Describing the perceived value of integrating IK when learning science.
		C4. Describing what they believe indicates that have learned science during the presentations by the community members on IK and cultural practices about the traditional foods.
	DISPOSITIONS	D1. Describing their ability in learning science during the integration of IK when teaching the topic on nutrition.
		D2. Describing their attitudes towards learning science during the presentations by community members on IK and cultural practices about the traditional foods.
		D3. Describing the learning approaches during the integration of IK when teaching the topic on nutrition.
		D4. Describing their perceived value and evidence of learning science during the integration of IK when teaching the topic on nutrition.

Appendix F: Journal Reflections

Instruction: Answer all the following questions

1. What have you learned from this lesson?

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2. What have you enjoyed in this lesson?

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3. What have you not enjoyed in this lesson?

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4. How can the lesson be improved?

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Appendix G: Interview Questions

The researcher is interested to find out the effect of integrating indigenous knowledge (IK) when teaching the topic of nutrition in grade 6 class in one of the Eastern Cape township schools.

Researcher : Tell me about your experience in attending Natural Science lesson.

Learner :

Researcher : What do you think are the reasons for your experiences that you have just mentioned ?

Learner :

Researcher : How did you find the inclusion of indigenous knowledge during the teaching of nutrition ?

Learner :

Researcher : What do you think are the reasons for your experiences you have just mentioned ?

Learner :

Researcher : Is there anything that you would like to suggest to whoever is responsible for science curriculum, especially the life and living section, which in your opinion could help other natural sciences learners to master the subject ?

Learner :

Appendix H: Journal Reflections Colour-Coded

Questions	L1	L2	L3	L4	L5	L6
1. What have you learnt from the lesson?	I learnt everything about eggs, imifino, amasi & meat.	I learnt very much about my culture.	I learnt about different cultures.	I learnt about things that happened long ago.	I learnt that girls don't eat eggs.	I learnt that if girls eat eggs they will follow boys.
2. What have you enjoyed in the lesson?	I enjoy that many no,s everthing about girls.	I enjoyed that she was not greed to us.	I enjoyed about men not eating imifino.	I enjoyed about talking about old things.	I enjoyed when critical friend T1 shoot the lesson.	I enjoyed that girls must not eat inside meat.
3. What have you not enjoyed in the lesson?	I did not enjoy about girls that the girls will follow boys if they eat eggs.	I did not enjoy that girls should not eat eggs. I	I don't enjoy if your man abuse you and your parents	There is nothing that I did not enjoy.	Don't enjoy that men should not eat imifino.	I didn't enjoy that girls must not drink amasi.

		don't agree.	said go back to him.			
4.How can the lesson be improved ?	To forgot about old things and past things.	It can be improve d like to follow it by doing	To be improve d by adding other cultural foods.	We can talk about more cultural beliefs.	Men are allowed to eat Imifino !	No improvement is needed.

Questions	L7	L8	L9	L10	L11	L12
1.What have you learnt from the lesson?	I learnt that girls should not eat eggs	I learnt about meat and imifino.	I learnt that women not allowed to drink amasii	I learnt that girls must not eat eggs	I learnt that girls should not eat eggs.	I learnt that people allowed to eat inside meat are old man.
2.What have you enjoyed in the lesson?	I enjoyed that boys cannot eat eggs.	No comment	I enjoyed that amasii have	I enjoyed that men are not suppose to eat imifino, they	I enjoyed that people when they eat eggs they	I enjoyed that man are not allowed to

			after taste.	will be nyenyenye.	would be pregnant.	eat imifino.
3.What have you not enjoyed in the lesson ?	I did not enjoy that men cannot eat imifino.	I don't enjoy the amasi and eggs not to be eaten.	I don't enjoy that girls are not allowed to eat eggs.	I didn't enjoy that girls must not eat eggs.	I did not enjoy that girls cannot drink amasi.	I did not enjoy that girls are not allowed to eat eggs.
4.How can the lesson be improved ?	That I can't eat imifino.	No comment	It can be improved that both women & girls must be allowed to eat eggs & amasi.	When you are engceni (menstruating) do not eat amasi and milk.	Girls do not eat amasi.	To forget about old and past things

Appendix I: Focus Group Interview Transcription

How do Grade 6 learners' conceptions, dispositions and interest shift/evolve (or not) as a result of the presentations by the expert community members on stories about cultural beliefs and practices on traditional foods such as *amasi*, *imifino*, *amaqanda* and *inyama*?

1. **Ngexesha oomama basekuhlaleni benifundisa ngeenkubeko zakwantu ufunde ntoni? What did you learn from the presentations by the expert community members?**

L1 (Sihle): Ndiyikhumbula kwisifundosokuqala selungu lase kuhlaleni , xa ebegxininisa ukuba amantombazana akulindelekanga batye amaqanda ngoba bazakulandela amakhwenkwe.

I understand it from the first presentation by the community member, when she stressed that the girls were not supposed to eat eggs because they will go after boys.

L2 (Zanele): Ndiva ukuba amantombazana akufuneki bawa sele Amasi xa besexesheni kuba iyakulandisa ixesha labo lokubasexesheni.

I understand about the Amasi that girls must not drink Amasi during menstruation as it will prolong it.

L3 (Luthando): Ndiyavumelana no Sihle xa esithi amantombazana mabangawatyi amaqanda lonto izakubenza balandele amakhwenkwe.

I agree with Sihle when she said that girls should not eat eggs as it will make them follow boys.

2. **Zithini izimvo zakho malunga nokufakwa ulwazi lwakudala eklasini yenzululwazi? What are your views on the inclusion of local knowledge in science class?**

L1 (Sihle): Ndicinga ukuba ukufakwa kolwazi lwakudala kwisifundo senzukulwazi kubalulekile yaye kufuneka lufakwe eklasini ukuze amantombazana atya amaqanda angafunda ngokungozi bokutya amaqanda.

I think that the integration of local knowledge in school science is important and should be included in the curriculum so that those girls eating eggs can learn about the dangers eating eggs.

L2 (Zanele): Ndiyavumelana no Sihle ukuba ulwazi lwakudala malufakwe kwisifundo senzukulwazi. Oludibaniso luzakusineda singazityi izinto ezazingatyiwa ngokhokho bethu.

I agree with Sihle that the local knowledge should be integrated in science curriculum. That integration will help us not to eat that was not eaten by our forefathers.

L3 (Luthando): Ndiyavuma ukuba ulwazi lwakudala maludityaniswe kwisifundo senzukulwazi, uke xa sibadala singabazali nathi sikwazi nathi sikwazi ukufundisa abethu abantwana malunga neenkubeko zethu.

I agree that the IK should be integrated in science curriculum because, when we are old as parents we will also teach our children about these cultural practices.

3. Lo luphi ulwazi lwakudala ucinga lubalulekile kubafundi ukufunda ngezinto ezityiwayo?

What local knowledge do you think will be important for learners to learn nutrition?

L1 (Sihle): Ndifumanise ukuba amaqanda mawangatyiwa ngamantombazana, ndifumanise ukuba oko kubalulekile xa ndibona apha ekuhlaleni ukuba amantombazana atya amaqanda bavutywa baphi kwexesha yaye alandela amakhwenkwe. Bona abo bangawatyiyo amaqanda bona abawalandeli amakhwenkwe phambi kwexesha. Into endingayaziyo kukuba amakhwenkwe awatyayo amaqanda

ukuba bayawalandel amakhwenkwe wona kona endikubonayo ngamantombazana abawatyayo amaqanda ukuba wona ayawalandela amakhwenkwe phambi kwexesha.

I find that eggs not to be eaten by girls is correct, as I find it important and I can witness this in my local community that girls who eat eggs become fertile and run after boys. Those who do not eat eggs do not go for boys at the early stage.

I am not sure if boys who eat eggs that they go for girls, what I know is that girls who eat eggs go after boys at an early age.

L2 (Zanele): Ndifumanise kubalulekile ukuba imifino mayingatywa ngamadoda kuba abo benzanjalo banyabile kunamanye amadoda yaye abanakulwa namanye amadoda angayityiyo imifino. Loo madoda asoloko etyhafile, ndide ndamcebisa utata wam ukuba angayityi imifino naye wavuma. Akakayityi imifino emva koko.

I find it important about imifino not to be eaten by men because they will be weak than other men and cannot fight against other men who are not eating imifino. Those men are always tired.

I advised my father not to eat imifino after the presentations by the community members and he agreed, he has not eaten imifino eversince.

L3 (Luthando): Ndifumanise kubalulekile ukufunda ngamasi ukuba angatywa ngamanenekazi xa esexesheni kuba izakulandisa ixesha lokuba sexesheni.

I find it important to learn about amasi not to be eaten by women when they are in menstruation as it will prolong it.

4. Ngawaphi amaqithiqithi wokufaka ulwazi lwakudala xa kufundiswa isihloko malunga nezinto ezityiwayo?

What are the benefits of including local knowledge in teaching of the topic on nutrition?

L1 (Sihle): Ulwazi lwakudala luzakufundisa amanenekazi ukuba bangawatyi amasi xa besexesheni kuba izakulandisa ixesha labo.

The local knowledge will teach women not to drink amasi during menstruation as it will prolong it.

L2 (Zanele): Ndiyavumelana no Sihle ukuba amantombazana angawatyi amaqanda yaye angawaseli amasi xa esexesheni yaye angabelani ngesondo xa esexesheni.

I agree with Sihle that girls not to eat eggs and drink amasi during menstruation and not to practice sexual activity during menstruation.

L3 (Luthando): Kulungile ukuba amantombazana angawatyi amaqanda kuba azakulandela amakhwenkwe.

It is good for the girls not to eat eggs as they will follow boys.

5. Ucinga ukuba bobuphi ubunzima bokufaka ulwazi lwakudala ekufundiseni? What do you think could be the challenges for including local knowledge in teaching?

L1 (Sihle): Ndinga ukuba amantombaza abanokwazi ukuwayeka amaqanda kuba lawo sebwatya amaqanda sebeqalile ukulandela amakhwenkwe.

I think that girls cannot stop eating eggs as those who are eating them are already sleeping with boys.

(Umbuzo olandelavo) Follow up question

Xa beyekile ukutya amaqanda baze bagula ngenxa yezakha-mzimba ezisemaqandeni, ingaba kulungile na ukuba bangawatyi amaqanda kule meko?

If they stop eating eggs what do you think will be the effect of that?

L1 (Sihle): Ndiyavuma kulo meko ukuba amaqanda bangawaty ngenxa yempilo kodwa lonto ayizukuba nqanda ekulandeleni amakhwenkwe.

In that case they need to eat eggs for health reasons but it will not stop them from running after boys.

L2 (Zanele): Ndicinga ukuba amantombazana mabayeke ukusela amasi xa besexesheni.

I think girls should stop drinking amasi during menstruation.

L3 (Luthando): Uzakuba nentswelo yezakhamzimba xa ungawatyayo amaqanda nemifino.

You will lack vitamins and proteins because you are not eating eggs and imifino.

6. Yeyiphi enye into onqwenela ukuyivakalisa malunga nolwazi lwakudala kwisifundo se nzululwazi?

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

L1 (Sihle): Into endiyithandileyo ethethwe ziingcali zasekuhlaleni, yeyokuba amantombazana mabangawaty amaqanda kuba bazakuvutwa phammbi kwexesha yaye baqale bazibandakanye kwezesondo. Into endiyiqaphelayo kukuba amantombaza seleqalile ukuzibandakanya kwezesondo kuba besitya amaqanda.

What I liked by what was said by the community members, is that girls must not eat eggs because they will be fertile and be sexually active. What I noticed is that girls are sexually active due to eating of eggs.

L2 (Zanele): Amantombazana awanokuyeka ukutya amaqanda kuba sebeqalile ukuzibandakanya kwezesondo yaye bade balwele amakhwenkwe.

Girls cannot now stop eating eggs as they are already sexually active and some fight for boys.

L3 (Luthando): Into endiyifundileyo kwizifundo zeengcali zasekuhlaleni kukuba xa usexesheni sukuwasela amasi.

What I learnt from these presentations is that when you are menstruating do not drink amasi.

(Umbuzo olandelayo) Follow-up question

Ingaba ikhona na enye into othanda ukuyitsho malunga nokuthe wakufunda kwi zifundo zeengcali zasekuhlaleni?

Is there any other thing you would like to share that you learnt from the presentations?

L1 (Sihle): Lena ndiyifunde komnye umakhulu wasekuhlaleni xa esithi xa usitya umongo wethambo uzakuzala umntwana onemifinya.

This one I learnt from other old ladies from the local community, is it true to that when you are pregnant do not eat bone marrow (*umongo*) you will give birth to the child who will have (*umfinya*)?

L2 (Zanele): Umama wam undixelele ukuba unezilonda emathumbini sukuwasela amasi izakuzichukumisa zitsho zibebuhlungu.

My mother told me that if you are suffering from ulcers do not drink *amasi* because it will make them worse.

L1 (Sihle): Mandongeze malunga nemifino, ukuba uyindoda etya imifino uzakuthamba umzekelo ukuba amadoda amabini ayalwa onye utya imifino uzakoyiswa yile ndoda ingawutyiyo imifino kuba lo utya imifino uthambile.

Let me add about eating *imifino*, as a man if you eat *imifino* you will be weak for example if two men are fighting the one eating *imifino* will be overwhelmed by the one who is not eating them, because the one eating *imifino* will be weak.

L3 (Luthando): Ummelwana wam uthi ukba inenekazi li khulelwe makayeke ukusela amasi oko kuyakudala ingxaki ezininzi ezinje ngokuphuma kwesisu.

My neighbor said that if a woman is pregnant she must not drink *amasi* and that will result into problems and complications like miscarriage.

Appendix J: Grade 6 Natural Sciences/ Tech Strands

Strands NS & Tech		Strands NS & Tech		Strands NS & Tech		Strands NS & Tech	
Life and Living	Processing	Matter and material s	Processing	Energy and change	Systems and control	Planet Earth and Beyond	Systems and control
Photosynthesis Nutrients in food Nutrition Ecosystems and Food webs	Food Processing	Solids, liquids and gases Mixtures Solutions as special mixtures Dissolving Mixtures and water resources	Processes to purify water	Electric circuits Electrical conductors and insulators Mains electricity	Systems to solve problems	The Solar System Movements of the Earth and planets The movement of the Moon	Systems for looking into space Systems to explore the Moon and Mars

Appendix K: Term 1 Topics

GRADE 6 TERM 1				
STRANDS: NATURAL SCIENCES: LIFE & LIVING TECHNOLOGY: PROCESSING				Equipment and Resources
Time	Topic	Content & Concepts	Suggested Activities: Investigations, practical work, and demonstrations	
1 ½ week (5 ¼ hours)	Nutrients in food	<p>Food Groups</p> <ul style="list-style-type: none"> foods can be grouped according to their functions in the body and the main nutrients they supply: <ul style="list-style-type: none"> foods for energy - carbohydrates foods for growth and repair -proteins foods for storing energy (in the form of body fats) and providing insulation and protectionfor nerves and organs <ul style="list-style-type: none"> fats and oils foods for building bones and teeth, and maintaining a healthy immune system - vitamins and minerals most natural foods contain a mixture of more than one nutrient group most processed (manufactured) foods have added salt, sugar, preservatives, flavourings and colourings 	<ul style="list-style-type: none"> sorting foods into the four different nutrient groups <ul style="list-style-type: none"> carbohydrates in foods such as bread, sugar, mealie meal, potato, rice, pasta proteins in foods such as eggs, beans, meat, fish, cheese fats and oils in foods such as margarine, cooking oil, butter vitamins and minerals in foods such as fresh fruits and vegetables, milk (source of calcium) reading labels on food packaging to look for the nutrients and/or the additives in the food 	<ul style="list-style-type: none"> Examples of different foods representing the different food groups and food packaging.

Appendix L: Guiding Question for Focus Group Interviews

Each group was given 10-15 minutes to discuss the following questions:

1. What stories about cultural beliefs related to traditional foods do you know from your homes and community?
2. What stories about cultural practices related to traditional foods do you know from your homes and community?
3. What relevance do you think these stories about cultural beliefs and practices have in science?

END