INTEGRATING INDIGENOUS KNOWLEDGE INTO THE TEACHING OF WEATHER AND CLIMATE IN THE GEOGRAPHY CURRICULUM IN SECONDARY SCHOOLS: THE CASE OF MANICALAND IN ZIMBABWE

BY

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DEDICATION

This thesis is dedicated to my late parents (Amos Haadi Risiro and Tracy Bhera Risiro) whose upbringing exposed me to *unhu/ubuntu* values.

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DECLARATION

I, Joshua Risiro declare that:

i) The research report in this thesis, except where otherwise indicated, is my original work.

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iii) This thesis does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.

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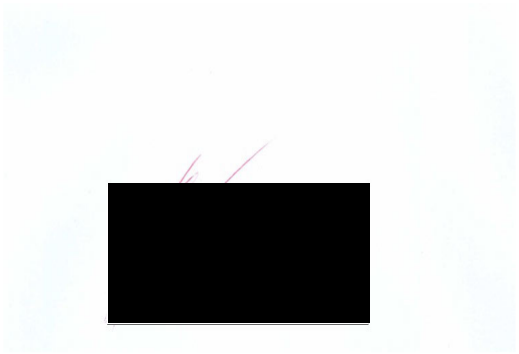

Signed: [redacted] ----------

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ABSTRACT

The aim of this study was to explore integrating Indigenous Knowledge (IK) into the teaching of weather and climate in Geography in secondary schools in Manicaland Province of Zimbabwe. The study was motivated by the need to enhance and promote the integration of IK into the teaching of Geography in Zimbabwe. Available literature has shown that very little has occurred to integrate IK in the teaching of Geography in Zimbabwe. Most of the available literature has focused on the nature and importance of IK without explicitly focusing on the application of IK in teaching. This study therefore focused on the views of teachers and community elders regarding decolonisation of the curriculum and integrating IK in the teaching of weather and climate in Geography. The study further explored how IK can feature in the teaching of weather and climate in Geography. Finally, the study examined the challenges that might be faced in the process of integrating IK in the teaching of Geography. The interpretive paradigm guided the study. A Qualitative research method that made use of interviews and focus group discussions was used to collect data from the participants. The population sample included interviews with fourteen (14) community elders and sixteen (16) education practitioners. In addition, seven (7) focus group discussions with community elders and another seven (7) with educators were facilitated. Purposive sampling was adopted to select the participants of the study. The study revealed that integrating IK into the Geoography syllabus was strongly mooted as a way of decolonizing the curriculum. The community elders were of the view that the integration of IK in the teaching of Geography was a way of restoring Zimbabwean national heritage which had been lost due to foreign influences stemming from colonisation. The elders believed that, the teaching of Geography was supposed to incorporate African *unhu/ubuntu* values and experiences among the learners that build a total person. Teachers believed that integrating IK in Geography would enhance the use indigenous pedagogical practices resulting in a better understanding of geographical concepts. It was revealed that the teachers could use various pathways of integrating IK in the teaching of Geography. Both the community elders and teachers believed that local language/dialect usage, indigenous methods of weather forecasting and the role of spirituality should be integrated in the teaching of Geography and this would provide a much-needed authentic education in the Geography curriculum. Thus, indigenising the Geography curriculum can also be heralded as cultural and linguistic pluralism in the syllabus which is currently absent. However, disappointingly, many Geography teachers held negative beliefs of indigenous practices and they did not believe that IK held equal status with western Science. They provided simplistic ideas such as cultural songs in the lesson introduction as a way of integratiing IK into lessons

on weather and climate. Several challenges to the integration of IK in the teaching of weather and climate in Geography were suggested by the participants and these included religious factors, government policies, modernisation, a lack of resources and assessment. The study advances a process model for the integration of IK in the Geography curriculum in Zimbabwe. It was observed that there was a need for future studies to research the use of indigenous knowledge and practices in classroom teaching to grow the literature in this field.

Key Words: Indigenous Knowledge; Integration; Weather and Climate; Geography; Decolonisation; Indigenous practices; Challenges

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LIST OF ABBREVIATIONS

BEST	Better Environmental Science Teaching
DSI	District Schools Inspector
FGD	Focus Group Discussions
IK	Indigenous Knowledge
IKS	Indigenous Knowledge Systems
WK	Western Knowledge
AIKS	African Indigenous Knowledge Systems
IPCC	Intergovernmental Panel on Climate Change.
ITCZ	Inter Tropical Convergence Zone
MPCDO	Manicaland Province Curriculum Development Officer
MPGI	Manicaland Province Geography Inspector
MoPSECF	Ministry of Primary and Secondary Education Curriculum Framework
MoPSE	Ministry of Primary and Secondary Education
PED	Provincial Education Director
UKZN	University of KwaZulu-Natal
UNDRIP	United Nations Declaration on the Rights of Indigenous People
UNESCO	United Nations Education Scientific and Culture Organization
USNCES	United States National Centre for Education Statistics
WS	Western Science
ZIMSEC	Zimbabwe School Examination Council

CHAPTER 1: AN INTRODUCTION TO THE STUDY

1.1 Introduction

The purpose of the study was to examine the views of teachers, education officers and community elders regarding the integration of Indigenous Knowledge (IK) in the teaching of weather and climate in Geography in secondary schools in Zimbabwe. The research also focused on how IK could feature in the teaching of weather and climate. Further to this, the study sought to explore the possible challenges of integrating IK in the teaching of Geography in the secondary schools. These views can contribute to the ongoing discussions on updating the curriculum (2015 – 2022) in Zimbabwe. The study was undertaken in the Manicaland province of Zimbabwe.

It has been asserted that the introduction of Western education and missionary activities among the indigenous/local people has degraded the value and respect of indigenous education and cultural beliefs (Nyati, 2001). Eyong, Mufuaya and Foyi (2004) argue that IK has suffered a long period of misrepresentation from Western colonization and religious activities. Fanon in his book, *African Skin, White Masks* cited in Mapara (2009), argues that colonialism promoted a superiority complex over the colonised. Franz Fanon, further suggests that, under colonialism, the social values of the colonisers are regarded as superior reigning over the colonised.

Additionally, the indigenous people ended up believing that their indigenous practices were wicked and retrogressive (Dei, 2000; Dyer, 2006; Mavhunga, 2006; Nyati, 2001; Ntaragwi, 2004). On the contrary, Western Knowledge (WK) was viewed as objective and progressive (Agrawal, 1995; Herbert, 2000; Mitchel, 1995). For example, the perceived characteristics of IK amongst Australians is sometimes approached with “mysticism, doubt and hesitation” (Mclaughlin & Whatman, 2015, p. 3). Thus, IK is closely linked to colonization.

Battiste and Henderson (2002) further argued that, colonial education has been retrogressive for indigenous people’s academic achievement and economic advancement resulting in drug misuse. The United States National Centre for Education Statistics (USNCES) observed that,

indigenous students had the highest failure rate from school in comparison to white learners (Freeman & Fox, 2005; Gilmore, 2010). It was further noted by Freeman and Fox (2005) that, there was a high mortality rate in the school going ages of between 15-19 years. Further, Freeman and Fox (2005) observed that, indigenous students had high absenteeism and they were frequently involved in violence. This situation has been attributed to inappropriate education for the local people. The poor performance of indigenous students has been caused by an inappropriate education system for indigenous communities. It has been observed that, the indigenous learners had high drop out rates in schools due to an irrelevant curriculum for them (Agbo, 2001; Barnhardt & Kawagley, 2005; Cushner, McClelland & Safford, 2012; Nichol, 2005; Skutnabb-Kangas &Dunbar, 2010).

Further, research has established that, indigenous learners face some difficulties when they are taught in a different language and using methods foreign from their home background (Gay, 2010). In Zimbabwe, the Nziramasanga Commission of inquiry into Education and Training (CIET), (Government of Zimbabwe, 1999) attributed student indiscipline in schools to the education system that was failing to offer them an indigenous education referred to as *ubuntu/hunhu*[1].

However, soon after independence Zimbabwe made some efforts to integrate various programmes into the education sector. An example was Better Environmental Science Teaching (BEST) (Chikunda, 2007). BEST aimed at promoting the teaching of Science. Despite the effort, the programmes failed to integrate significant IK in the classroom context (Shizha, 2006; Sigauke, 2016). Furthermore, the Government introduced Education with Production whose focus was on practical subjects such as Agriculture and Home Economics; Political Economy was additionally introduced to deal with the history of Zimbabwe and how the resources are contributing to the economy of the country. The Government went on to introduce Zimbabwe Science (ZimScience) whose focus was to improve the teaching of science subjects in the schools. This however, did not include the teaching of Geography.

[1] education that impacts good morals and community values.

Finally, Polytechnic Education which emphasised the teaching of technical subjects like Engineering was introduced in the schools (Gatawa, 1998; Zvobgo, 1997).

Education with Production was integrated with the aim of promoting productivity and self-reliance (Kanyongo, 2005; Mashingaidze, 1997; Mudzonga & Moyo, 1994; Nhundu & Chivore, 1993; Zvobgo, 1997). These programmes however, did not include how and what content could be integrated in the Geography syllabus particularly in the teaching of weather and climate in the secondary schools. Scholars (Mavhunga, 2006; Shizha, 2006; Sigauke, 2016) have acknowledged that, the current education system in Zimbabwe has done very little to integrate students' social background. This has created a gap hence my research study which explores the integration of IK in the teaching of weather and climate in the subject of Geography in secondary schools.

Studies have shown a mismatch between the public education[2] system and that of indigenous people. Public education has tended to ignore the knowledge that indigenous people bring into the classroom. This has negatively affected the academic performance of indigenous learners (Barnhardt & Kawagley, 2005; Cushner, McClelland & Safford, 2012; Gay, 2010; Skutnabb-Kangas & Dunbar, 2010). It is against this background that the research sought to explore integrating IK into the teaching of weather and climate in secondary schools by assessing the views from key stakeholders.

1.2 The Knowledge gap

Various studies have been carried out in Zimbabwe on IK (see Magwa, 2008; Mapara, 2009; Muguti & Maposa, 2012; Shava, 2005; Shizha, 2006; Shoko, 2012; Tatira, 2000). However, these researchers, in their studies have largely showed the forms of IK that are available and their importance to the society. Muguti and Maposa's study was on engaging the Shona people of Zimbabwe on indigenous methods in weather forecasting. Shizha (2006) study focused on formalizing IK in Zimbabwe and questioned the importance attached to Eurocentric school knowledge at the expense of indigenous knowledge. Mapara (2009) showed the importance of

[2] Learning that takes place in the schools

IKS in weather forecasting, farming and in indigenous medicines. It exposed how IK impacted people and how it is important as a form of knowledge. Tatira (2000) researched the role of taboos in Zimbabwe. The study focused on how different taboos are applied in natural resources conservation. The study revealed that, taboos were used by the community to uphold social values and the preservation of endangered species such as pythons. Shava (2005) documented wild fruits that are found in Zimbabwe. He explored the value of these wild fruits to the community as well as for educational research. Shava observed that, the knowledge and use of indigenous fruits was on the decline in Zimbabwe. Further, Shava's study revealed that, within the education sector in Zimbabwe, IK was still disregarded and viewed as substandard. Magwa's (2008) thesis, explored the possibilities of using indigenous languages as a medium of teaching in the education system. The study by Magwa revealed that the use of the local languages as a medium of instruction was still sidelined in Zimbabwe. Magwa's (2008) study further exposed that, English was still the dominant and preferred mode of teaching in the education system in Zimbabwe. In a similar study, Ndlovu (2019) showed that, there is still very little inclusion of IK practices in the curriculum of an agricultural college in Zimbabwe.

A summary of the research done in Zimbabwe on IK shows that the research carried out so far did not focus on the views of teachers and community elders on integrating IK into the curriculum and classroom teaching in the secondary schools. They neither looked at how IK can feature in the classroom teaching of Geography nor the challenges that may be faced in using IK in the classroom context. Available literature has not focused on how IK can be integrated in Geography in the teaching of weather and climate in the secondary schools, hence there is a gap in the available scholarship. Scholars among them Matsika (2012), Ogunniyi (2016), Pedzisai (2013) and Shizha (2008) have all acknowledged that there is minimum application of IK in the classroom teaching in Zimbabwe.

More so, the geographical area where these studies were undertaken in Zimbabwe is different from my study area. Indigenous knowledge is geographically specific such that whatever findings obtained in those study areas may not necessarily apply to another study area. It is this missing link in the other research in Zimbabwe between IK and classroom practice in Geography that demonstrates the knowledge gap that my study sought to address. The study

therefore contributes to knowledge on how IK could be integrated in the teaching of weather and climate in Geography in secondary schools.

1.3 Significance of the Study

This section discusses the contribution of the thesis to different educational stakeholders. Studies by Matsika (2012), Ogunniyi (2016), Pedzisai (2013) and Shizha (2008) all points that there is minimum use of IK in classroom teaching. The study therefore contributes to how IK could be integrated in the teaching of weather and climate. The research also provides suggestions on how an indigenous pedagogy can be applied in classroom practice. For teachers, it may help in their teaching thereby contributing to an enhanced understanding of weather and climate aspects for the learners.

The findings on the views of teachers and the community elders regarding the integration of IK in the teaching of weather and climate may assist policy makers during the implementation and review process of the Geography syllabus (2015-2020)[3] in secondary schools. The research findings from this study can thus be used as a guideline document to integrate IK into the Geography curriculum in Zimbabwe and at global level during the reviewing process of the syllabus. In this way, the views elicited from the teachers and community elders can help policy makers and curriculum developers to formulate policies and refine the secondary school Geography syllabus.

1.3.1 Methodological and Conceptual contributions of the study

Research carried out in Zimbabwe on IK has focused much on the forms and importance of IK (Magwa, 2008; Mapara, 2009; Muguti & Maposa, 2012; Shava, 2005; Shizha, 2006; Shoko, 2012; Tatira, 2000) as elaborated on earlier. This study therefore improves on the content of IK and the methods of teaching weather and climate in the classroom.

[3] This is the new Geography syllabus for forms one up to form four that has been recently introduced in the schools by the Ministry of Primary and Secondary Education

The findings from the study have identified IK content for integration in the Geography curriculum and the participants in the study elaborate on how this IK can feature in the teaching of the topic 'weather and climate' in Geography. The research findings have identified indigenous methods that are used to teach children in the community and which could be applied in the teaching of weather and climate in the classroom situation not only in Zimbabwe but at regional and global levels. This can improve the comprehension of weather and climate concepts among the local and global learners and teachers as stated by Castagno & Braboy (2008). It is asserted that, teaching and learning becomes easier (Shizha, 2014) and learners acquire knowledge from different sources and from different perspectives when IK is introduced into the lessons (Dei, 2000).

Practically, the final report can be used as a guide in teaching IK related to weather and climate in Zimbabwe and at global level. Theoretically, the integration of IK on weather and climate studies is a shift from the existing studies in Zimbabwe that were emphasizing the forms and importance of IK more so with a bias to languages and biological sciences.

Conceptually, the inclusion of IK in Geography is a shift from existing IK studies in Zimbabwe that have been carried out in the languages (Magwa, 2008). The study differs with other studies that focused on the forms and importance of IK (Mapara, 2009; Muguti & Maposa, 2012; Shoko, 2012) with no application to the classroom context. Previous knowledge gained from indigenous communities has not helped in exploring how IK can be integrated into the Geography curriculum in secondary schools, for example with Mapara (2009) who studied the Tangwena people in Zimbabwe. Mapara (2009) observed that, the community used IK to forecast weather and predict weather hazards. He also noted that the traditional society in Zimbabwe had some means to educate their children including storytelling. However, Mapara (2009) did not pursue how this valuable IK could be harnessed in the public education system. Other studies by Muguti and Maposa (2012) and Shoko (2012) researched IK and indigenous weather forecasting but they are not linked to the application of IK in the teaching of Geography, neither do they have an aspect on education. Where there has been IK links to the classroom, the studies have been in the fields of the Sciences (Shizha, 2008) and Agriculture (Pedzisai, 2013).

The research therefore contributes to indigenous pedagogy and indigenous terms that may be used to teach aspects of weather and climate in secondary schools in Zimbabwe and at a global level. It has been argued that the integration of IK improves classroom teaching and comprehension as a result of improved interaction. Shizha (2014) observed that, the use of indigenous pedagogy in the classroom enhances interaction among the learners during the lesson as well as in promoting the comprehension of concepts. The study solicited information from the teachers and community elders who are mainly the custodians of IK (Matsika, 2012; Mpofu, Otulaja & Mushayikwa, 2013). Therefore, during the course of the study it was vital to interview and hold focus group discussions with the elders on IK. The research report is therefore a useful source which both students and teachers can refer to. This is bound to improve the understanding of geographical concepts by the learners. Further, the aging elderly community members who are knowledgeable about indigenous practices are dying and this research provides a bank of knowledge on indigenous knowledge.

The present thesis is therefore a store of knowledge on indigenous practices which students and teachers can refer to and utilize for teaching and learning. The data collected from the elders can help teachers to teach IK content. These elders provided indigenous pedagogy which they used to teach their children (Mapara, 2009). Teachers therefore, can apply this pedagogy in their classroom practices.

Data generated from community elders therefore contributed to both methodological and conceptual issues. The curriculum development unit in the Ministry of education benefits from such studies as they have a document on IK in place that they can refer to when developing or reviewing the Geography syllabus. This document is important in the fulfillment of the Government and Ministry of Education philosophy of *unhu* as enshrined in the Nziramasanga Presidential Commission of inquiry into Education which was established in 1999.The Commission was tasked with a responsibility of developing a document that guides education and training in Zimbabwe (Government of Zimbabwe, 1999). Amongst its recommendations, was the need to provide education guided by *unhu* education that promoted virtues including community responsibility and respect (Government of Zimbabwe, 1999). *Unhu* is a social responsibility that covers these virtues (Mandova & Chingombe, 2013). This research contributes to fulfilling this mandate as these qualities are captured in the thesis. The document

can also be used for policy development, implementation and review at regional and global levels.

Zimbabwe, like any other country, is affected by the effects of climate change. The economy of Zimbabwe is agro-based, yet modern weather forecasting is becoming less reliable due to the unpredictable weather changes caused by global warming. The Zimbabwean situation is worsened by the poor state or the absence of weather stations to predict weather with greater accuracy in some parts of the country. Aguado and Burt (2010) argue that, weather forecasting is becoming less reliable due to a lack of accurate information on atmospheric composition. In Zimbabwe, the knowledge and skills for interpreting weather is restricted to the meteorological station in Belvedere, Harare that is facing challenges in projecting accurate temperatures for the whole season due to outdated technology (Zinyemba, 2015).

The use of IK in complementing modern methods in weather forecasting and mitigation of weather hazards has been effectively used in Tanzania (Mhita, 2006) and in Western Kenya (Thompson Reuters Foundation, 2012). This research is valuable in providing skills of weather forecasting that have been used by the indigenous people. This can be used to complement modern methods of weather forecasting in providing more reliable forecasts.

The study allows the decolonisation of the Geography curriculum through the development of indigenous content and methodology for classroom practice. Fanon (1963) asserts that, for decolonisation programmes to be successful, change needs to take place. This change might come through integrating IK in the teaching of weather and climate in Geography. Khupe (2014) notes that decolonizing the curriculum is a step towards recognizing the importance of IK as a form of knowledge. Baskin (2006) concurred by observing that, the decolonisation of the curriculum allows indigenous communities to control their information and cultural knowledge. Mosweunyane (2013), further agrees that, indigenous perspectives promote the use of indigenous pedagogies in the classroom such as the use of traditional songs.

The study is therefore important in contributing to how decolonizing the Geography curriculum could be enhanced in Zimbabwe, regionally and globally. The study is critical in exploring

ways in which IK can be integrated in Geography and taught in secondary schools. This is missing in studies which have so far been done in Zimbabwe. Teachers and community views regarding the integration of IK in the teaching of weather and climate are crucial as they would guide policy makers and curriculum developers during the curriculum review process and in the current debates on the Geography curriculum (2015-2022).

1.4 The study area and implications for my research

This section provides a brief description of the study area's social, economic, environmental conditions and how they impact on the research.

1.4.1 Location of the study area

Manicaland is a Province in Zimbabwe which is situated along the country's eastern border with Mozambique and Mutare is the Provincial capital. Mutare is 265 kilometers by road from Harare which is the capital city of Zimbabwe. The Province has seven administrative Districts namely Buhera, Chimanimani, Chipinge, Makoni, Mutare, Mutasa and Nyanga as illustrated in Figure 1.1. Participants in the research have been selected from each of the seven Districts.

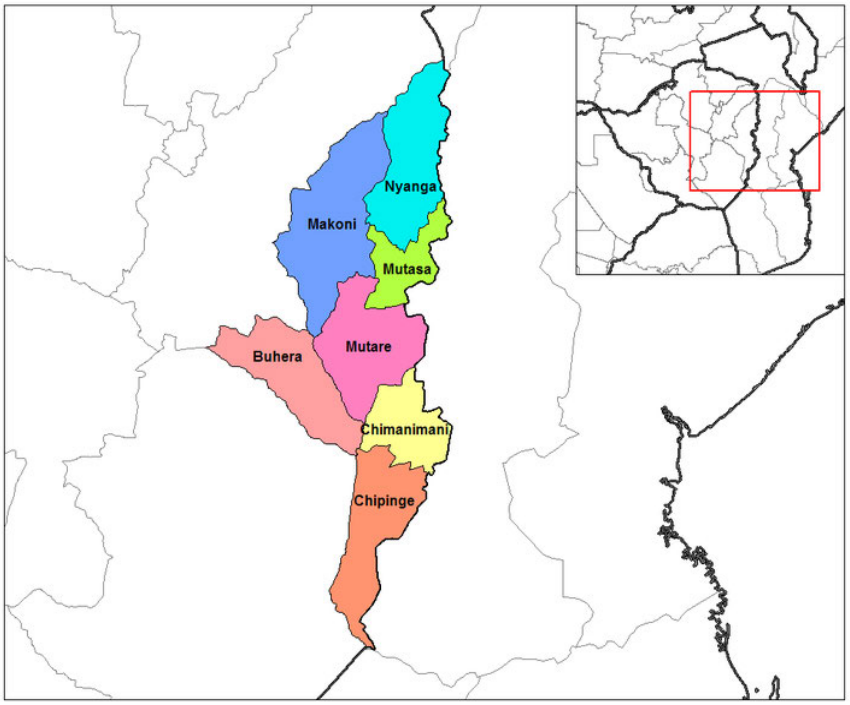

Figure 1.1: Study Area

1.4.2 Biophysical environment of the study area

Manicaland is a mountainous region with a diversity of plant and animal species. Chipinge, Chimanimani, Mutasa and Nyanga receive rainfall in excess of 750 mm per annum on average. The Districts are endowed with mountain vegetation such as *mnondo* and *msasa*. Buhera District is a dry region which receives less than 750mm per annum. In terms of vegetation, Buhera predominantly consists of acacia plants. The variations in rainfall amount received across the region has contributed to diverse flora and fauna used as a tool by the indigenous people to predict weather and seasonal variations.

Manicaland Province has a population of 1,752 million (ZIMSTAT, 2012). The local language mainly spoken by the people is Shona. Shona is the dominant language spoken in the study area particularly by the community elders. The local language has several dialects. In view of this, all the research instruments were translated into Shona to cater for the participants who may wish to give their responses in the local language, Responses given in Shona were translated into English during report writing. Some of the English terms that are used to describe geographical aspects in the teaching of weather and climate were also given their meaning in the local language, Shona. This ensured wide readership and understanding of concepts. Consent forms were also translated from English to Shona to enable the participants who may be conversant with Shona to fully understand the contents of the forms.

In terms of religion the people mainly practice Christianity and African traditional religion. It was important for the study to solicit the views of people with different religious perspectives on integrating IK in the teaching of weather and climate in Geography in the secondary schools. This provided an information rich sample for the study. African traditional religion was crucial in understanding IK especially the element of spirituality and indigenous traditions. The study therefore selected community elders as part of the population sample since they have a better understanding of African traditional religion and IK.

There are two hundred and ninety-eight (298) secondary schools across the Districts (ZIMSTAT, 2012). I therefore used convenience sampling to select fourteen (14) schools for the study. Two (2) schools were selected from each of the seven Districts in the Province. The

interviews and focus group discussions with teachers and community elders were drawn from the 14 schools and the community around the schools. The choice of the 14 schools allowed for an in-depth study.

1.4.3 Economic Environment of Manicaland

Economic activities in the province typically consists of subsistence farming in the rural areas. Commercial farming is practised in wetter regions such as Chipinge, Chimanimani and Nyanga. In these areas horticultural crops are grown as well as timber. Diamond mining takes place in Mutare rural and in Chimanimani Districts. Tourism is a dominant activity in Chimanimani, Nyanga and Mutare in the Vumba forests.

1.4.4 Reasons for selecting Manicaland as study area

Manicaland province was selected as a study area for cultural, bio-physical and personal reasons.

1.4.4.1 Cultural and physical reasons for selecting Manicaland

The choice of location for the study area is Manicaland province as study area was premised on a number of reasons. There is diversity in religious beliefs, ethnic groups and the physical environment which made the study of IK more interesting as different conceptions were articulated during the data generation process. The religious beliefs include African Traditional Religion and Christianity. People from a diverse religious background helped to provide varied views on the integration of IK in secondary schools. The physical environment provided a diversity of flora and fauna used by indigenous people to predict weather patterns which is important for teaching in the secondary schools. Data was generated from different participants-people, who provided rich perspectives regarding the integration of IK in the teaching of weather and climate in the secondary schools. The study of the whole of Manicaland region allowed the researcher to generate data from a wide spectrum of communities. The selection of participants in each District provided a true representation of the views of the people across the Province.

1.4.4.2 Personal reasons for selecting Manicaland for the study

The researcher also chose Manicaland region for study as the researcher was born and bred in the province. The researcher grew up being exposed to practical skills such as looking after livestock. In addition, the elders taught the youngsters indigenous values such as respect and sharing. The virtues of *unhu* were promoted in the extended family through family teachings by the elderly members of the family. As boys we were also taught manhood roles such as farming and ways of forecasting weather by family elders. During the evening family members gathered around the fire place discussing issues which were important to life.

This background influenced the research methodology and the conceptual frameworks that were adopted in this study. Therefore, interviews and focus group discussions were employed to solicit the conceptions of teachers and community elders on integrating IK in the classroom teaching. Such a background enabled an appreciation of indigenous practices by youths. This influenced the decision to find out how indigenous practices can feature in the teaching of weather and climate in Geography in the secondary schools.

The diversity of Manicaland province in terms indigenous practices and geographical variations provided the researcher with rich information on the IK that could be integrated and taught in the Geography class on weather and climate. It provided the researcher with different terms used by indigenous people to describe different aspects of weather and climate.

1.5 Rationale for the Study

The rationale for this study is addressed in terms of professional, contextual and personal rationales.

1.5.1 Professional rationale

The researcher has been involved in the marking of Geography public examinations in Zimbabwe for the past fifteen (15) years and has realized that few candidates and examination centres attempted questions on weather and climate. The few candidates who attempted

questions on weather and climate demonstrated poor mastery and understanding of the concepts involved.

The researcher has also experienced challenges in teaching the topic during workshops and seminars with secondary school teachers. Teachers have shown poor understanding of the topic on weather and climate. Some teachers do not teach the topic at all thereby jeopardizing learners' chances of attempting questions from a wider selection.

The other worrisome situation is that, climate change and variability are impacting agriculture negatively, yet agriculture is the mainstay of the province's economy and indeed that of the country. Most of the rural people depend on agriculture, however, the young generation which is supposed to provide solutions to the problem of weather hazard seem not to master and understand the concepts on weather and climate. Suffice to say, agriculture is indeed inextricably linked to weather and climate.

1.5.2 Contextual rationale

It is noteworthy that, the topic, weather and climate is deficient on IK yet modern weather forecasting is becoming increasingly less reliable due to the unpredictable weather changes caused by global warming. The Zimbabwean situation is worsened by the poor state or the absence of weather stations which record information used for predicting weather across the country with more accuracy. The knowledge and skills to interpret weather is restricted to the meteorological station in Belvedere, Harare, Zimbabwe that is also facing challenges in projecting accurate temperatures for the whole season due to outdated technology (Zinyemba, 2015).

It is argued that, Zimbabwean communities have a lot of untapped IK on weather and climate which can be integrated into the Geography component of weather and climate. Such knowledge can be harnessed for the effective teaching of short to medium term weather forecasting as has been argued by Mapara (2009) and Maposa and Muguti (2012). It has been observed that indigenous students' success tends to occur in those institutions which include

culture within their education system (Bat, 2011; Battiste, 2000; Kanu, 2007; Walker, 2000). The arguments presented above, show that students' learning is more effective if it is embedded with IK where learners' experiences are integrated.

These views support the quest for integrating IK in the teaching of weather and climate in order to enhance the understanding of more complex and theoretical concepts of the topic on weather and climate. It is assumed that a curriculum based on indigenous culture and appreciates knowledge from various sources would provide learners with skills to effectively make decisions that uplift people's livelihoods. An integrated curriculum in this study, is one that values the core – existence of different forms of knowledge as viewed by Friesen and Friesen (2002). Knowledge from the local community can therefore be integrated with Western knowledge in the teaching of weather and climate in order to equip learners with decision making skills that improves the lives of the learners and communities.

As noted earlier on, studies of IK in Zimbabwe (Magwa, 2008; Mapara, 2009; Muguti & Maposa, 2012; Shava, 2005; Shizha, 2006; Shoko, 2012; Tatira, 2000) have largely focused on the importance and use of IK in the communities. They did not explore how this knowledge could be integrated and taught in the Geography lessons. Researchers (Magwa, 2008; Mapara, 2009; Tatira, 2000) have carried out their researches with emphasis on the languages without looking at integrating IK in the classroom context. On the other hand, Shava (2005) and Shizha (2006) focused their attention on the sciences other than Geography. The other researchers (Muguti & Maposa, 2012; Shoko, 2012) explored indigenous ways of predicting weather without reference to its relevance to classroom practice.

The research carried out so far in Zimbabwe has left a gap in the area of integrating IK into the teaching of the topic of weather and climate in Geography. The Zimbabwean existing literature has not explored the views of teachers and the community regarding the integration of IK into the teaching of weather and climate studies. Further, existing literature has not focused on how IK can be used in the classroom context. A deficit of IK literature on its application in the teaching of Geography in the secondary schools provides a gap for this study to fill.

1.5.3 Personal rationale

The researcher has a strong rural background. For someone who grew up working in the fields and herding livestock, it was common practice to sit down with elders around the fire place during evening discussions. It is during such discussions that, as youths we were exposed to indigenous ways of weather forecasting as they were relevant to farming and day to day activities. But nowadays as people grow up and go to school, I, the researcher, realized that none of this IK seems to be taught in the classroom. Reflecting back on my secondary education, I feel that there is a gap in IK in the subject of Geography which did and still does not receive enough attention. This influenced me to find out the views of teachers and community elders regarding integrating IK in the classroom particularly in teaching the topic on weather and climate in Geography. I was also interested in how IK can feature in the teaching of weather and climate.

The research findings from this study could be used as a guideline document to integrate IK in the Geography curriculum in Zimbabwe or during the syllabus review process. The research might also possibly proffer suggestions on how indigenous pedagogy can be applied in the classroom practice. For teachers, it may potentially help their teaching thereby enhancing the understanding of weather and climate concepts by learners. The views elicited from teachers and community elders could help policy makers and curriculum developers to formulate policies and syllabuses.

1.6 Objectives of the study

The three objectives that guided the study are as follows:

1. to examine teachers' and community views on the decolonisation of the Geography curriculum and the integration of IK in the teaching of weather and climate in secondary schools;

2. to show how indigenous knowledge can feature in the teaching of the topic on weather and climate in Geography in the secondary schools; and

3. to explore the possible challenges of integrating indigenous knowledge in the teaching of weather and climate in Geography in the secondary schools.

1.7 Research questions

1. What are the teachers and community elders' views on the decolonisation of the Geography curriculum and the integration of indigenous knowledge in the teaching of weather and climate in the secondary schools?
2. How can indigenous knowledge feature in the teaching of the topic on weather and climate in Geography in the secondary schools?
3. What could be the possible challenges of integrating indigenous knowledge in the teaching of weather and climate in Geography in the secondary schools?

The details of the research questions are outlined in the following paragraphs:

Research question 1: The purpose of this research question was to elicit the views of the community elders and teachers regarding the decolonisation of the existing Geography curriculum and the integration of IK in the teaching of the topic on weather and climate in Geography in the secondary schools in Manicaland Province, Zimbabwe.

Research question 2: The research question aimed at acquiring from educational practitioners (teachers and education officers) and community elders, IK content that could feature in the teaching of weather and climate in Geography in secondary schools in Manicaland Province of Zimbabwe. This covers indigenous practices and experiences on weather forecasting, language usage, spirituality and pedagogical practices that could be integrated in the teaching of weather and climate.

Research question 3: The purpose of this question was to find out from educational practitioners and community elders challenges that may be experienced in integrating IK into the teaching of weather and climate in Geography in the secondary schools.

1.8 Outline of the thesis chapters

The thesis consists of six chapters outlined as follows:

Chapter 1 is an overview of the study. It covers the background of the study, the research problem and knowledge gap, objectives and research questions, the significance of the study and the rationale for carrying out the study. The last aspect of the chapter focuses on reasons for selecting Manicaland as the study area.

Chapter 2 covers literature review and the theoretical framework. It provides literature on the two fundamental concepts namely IK and WS. The chapter also explores educational issues during the pre and post-colonial eras in Zimbabwe and elsewhere. Integration strategies and case studies in which other programmes have been integrated in the school curriculum in Zimbabwe were discussed in this chapter. The conceptions of education stakeholders regarding the integration of IK also features in this chapter. In addition, the chapter outlines some of the challenges that could feature during the process of integrating IK. The theoretical frameworks and their relevance to the study are explained in this chapter.

Chapter 3 focuses on the research methodology that was used in the generation of data for the study. The chapter explains the research design, research objectives and research questions. The chapter discusses data generation methods and their relevance to the study. Data analysis and issues related to the trustworthiness of collected data are explored in the chapter. The chapter also covers data analysis procedures and ethical issues observed during data generation.

Chapter 4 dwells on the findings of the study. The findings are structured in three parts that are linked to the research questions. Part 1 explains the codes utilized in the study and characteristics of the participants. Part 2 provides the views of education stakeholders and community elders regarding the integration of IK in the Geography topic of weather and climate in secondary schools. Part 3 explores ways in which IK could be integrated into the teaching of the topic on weather and climate in Geography in the secondary schools. Part 4 focuses on the challenges that may be faced by different stakeholders in integrating IK in the studies of weather and climate in Geography in secondary schools.

Chapter 5 discusses findings that are linked to the literature review. The findings which are discussed are guided by the three research questions outlined in section 1.7.

Chapter 6 is on theory building emanating from the research findings discussed in chapter 5. It provides some important insights that emanated from the findings of the study.

Chapter 7 provides the summary, conclusions and recommendations of the study.

1.9 Conclusion

The chapter discussed the background to the study, reflecting on the studies that were undertaken by other scholars in Zimbabwe and elsewhere. The research problem and knowledge gap were discussed. The chapter went on to explain the significance and rationale of the study. Research objectives and research questions were stated and elaborated upon. In Chapter 2, the literature review theoretical framework will be discussed.

CHAPTER 2: REVIEW OF LITERATURE AND THEORETICAL FRAMEWORK

2.1 Introduction

Chapter one provided an introduction and background to the study. Studies that have been done in Zimbabwe and elsewhere to support the research gap were briefly explored. The research objectives and research questions have been stated in the first chapter. The significance of the study and its rationale were also justified. Chapter 2 is presented in two parts. The first part focuses on deepening the review of literature related to the study and it is informed by the three research questions. The second part explains the theoretical framework which guided the study.

2.2 The meaning of indigenous in the study

The meaning of the term indigenous is important to understand from the onset as it is the central phenemenon in the research. Khupe (2014, p.43) defines the term 'indigenous' as "something originally in the area or produced within the area." Knowledge is regarded as indigenous if it was there among the local people before being colonised (Ogunniyi, 2011). The Department of Education (2003) regards indigenous as something that emanated in Africa. The definition of indigenous shows power owned by the communities as is argued by Phiri (2008). Phiri, points out that, for the colonisers anything indigenous was regarded as regressive. The challenge from these definitions given above is the time frame when this knowledge would be perceived as local and the issue of human migration to the area.

For the purpose of this study the adopted understanding of 'indigenous' which is linked to 'knowledge' is in line with that proffered by Hewson and Ogunniyi (2011, p.680) who asserts that "indigenous are knowledge systems that existed before colonialism." In the case of Zimbabwe, where the case study research was undertaken, indigenous refers to the descendants of people who were in Zimbabwe before the colonization of Zimbabwe in the 1890's and thus the knowledge they have acquired from their forefathers is regarded as indigenous or local knowledge.

2.3 The Meaning of Knowledge in my study

The definition of the term knowledge is complex. It varies with one's philosophy and focus. The definition can change due to the social environment. There is also contestation on what constitutes knowledge. Nyota and Mapara (2008) views knowledge as ways of knowing while (Hewson, 2015) regards it as the way people see things. Similarly, Tefflo (2013) views knowledge as the means in which people live in their communities and in the same vein, Ogunniyi and Ogawa (2008) regard it as ways in which people behave.

2.4 Defining Indigenous Knowledge

Below are different definitions and interpretations of IK and finally I settle on a definition that is used in this study. Indigenous/local knowledge is knowledge that a particular community possess which determine their decisions (Haverkort, 1994; Hewson & Ogunniyi, 2011; Rajakasaran & Warren, 1993; Tefflo, 2013; Tekwa & Belel, 2009; UNESCO, 2017; Warren, 1991). This knowledge varies with time (Flavier, 1995; Mawere, 2015). It is often regarded as informal within a western perspective (Horsthemke, 2004). It has been defined as knowledge of people of a geographical area that has survived for a long period of time (Langil, 1999; Mawere, 2015; Mapara, 2009; UNESCO, 2017). Scholars such as Mawere (2015), Melchias (2001) and Stone (2007) concurs that IK is what the local people do and have done over time.

Several authors define IK in different ways. It has been referred to as "ways of knowing" (Nyota & Mapara, 2008, p.190), knowledge from rural areas (Altieri, 1995) and "local knowledge" (Graham & Ireland, 2008, p. 32). Mawere (2015) and Shizha (2010) perceives IK as constituting people's culture, the activities they practice and their beliefs. Pedzisai (2013, p. 245) views IK as "community knowledge unique for a given culture that solves societal problems." Indigegenous knowledge is the preserve of privileged individuals in the community. Khupe (2014) agrees that IK is communally owned but emphasises the practical aspect of IK. Odora-Hoppers (2005, p. 2) summarizes IK as, "knowledge and skills people of a particular geographical area possess". Local knowledge is manifested through culture and survival skills (Mawere, 2015; Odora-Hoppers, 2017).

There are common aspects pointed out by most scholars in their definition of IK such as the local nature of IK. The scholars also concurred that IK is transgenerational and a form of living through its practical nature. The current study because it is based in Africa, is guided by the definitions given by Shizha's (2010) and Mapara (2009). Shizha (2010, p. 28) views IK as "African indigenous science which is culturally specific including their knowledge on culture, their lives, spiritual world, natural environment and the activities they carry out such as farming." Mapara's (2009) definition centers on knowledge that people from a specific location have which has survived over time. The definition by Shizha and Mapara, covers both the tangible and intangible aspects of IK. They describe IK in a holistic nature and hence preferred for study. Mapara (2009, p.145) has shown that in Zimbabwe, "young men were taught at the *dare* (homestead meeting place for males) whereas young women were given an education called *yepamapfiwa* (education from the hearthstone[4])". Indigenous education was conducted using various teaching strategies such as music and folktales by the elderly family members. (Mapara, 2009). In this study the term IK is interchangeably used with the term local knowledge or traditional knowledge.

These definitions are relevant to the study since the study focuses on how different communities use their cultural practices, spiritual world such as spirit mediums and the environment (flora, fauna and the atmosphere) to study weather and climate. This constitutes an understanding of how IK could feature in the Geography syllabus. The researcher obtained views from the community elders, teachers and educational administrators on the integration of IK in the teaching of weather and climate from different parts of Manicaland. This was done because IK is geographically specific. The study also examines how culturally based IK could be integrated and taught in the Geography syllabus specifically centering on the topic of weather and climate.

[4] A hearthstone is a firewood cooking place with three/four legs made up of sun-dried earth or mud where pots are placed during cooking in the kitchen

2.5 Characteristics of Indigenous Education

The section outlines the nature of IK, how it is acquired, transmitted and the skills that are required for IK.

2.5.1 A practical yet gendered knowledge

Indigenous knowledge is not without contestation and although it is practical some knowledge is considered gender biased. African traditional education is meant to prepare children for adulthood (Odora-Hoppers, 2002). Education is community and skills based as it is supposed to meet the needs of the community (Iseke & Desmoulins, 2015). Boys were taught life skills like hunting and preparation for marital life (Mapara, 2009; Odora-Hoppers, 2002). The girls' curriculum included grooming, domestic chores and respect for family elders (Mapara, 2009). Of course, it can be argued that education of the girls and boys was distinctly gender based fitting normative male and female roles in indigenous society, but that is expected given that this is knowledge from a distant past when patriarchy dominated societies.

Further, Mahlatsi (2017) observed that, IK entails field activities. The learners engaged with the community through research on various aspects of life. Khupe (2014), in a study of Mqatsheni in South Africa observed that, the nature of IK was practical as children are taught practical skills. In addition, Darko (2014), observed that, the key objective to indigenous education is developing practical skills and building the character of the learners. Education among the indigenous people, according to Darko (2014), was meant to develop a total person with values helpful and acceptable in the community. Indigenous education is therefore sustainable since life skills and community values are passed from one generation to another (Mapara, 2009; Mosweunyane, 2013; Ross, 2006). Education was generally via the oral tradition.

2.5.2 Indigenous pedagogy

Indigenous pedagogy involves learners' acquiring knowledge through practical activities and discovery (Battiste, 2002; Mawere, 2015; Iseke & Desmoulins, 2015). It entails learning "independently by observing, listening and participating with a minimum of intervention or instruction" (Battiste, 2002, p. 15). Battiste's, definition of indigenous education entails the use

of various teaching strategies including practical activities and discovery approaches. Darko (2014, p. 194) suggests that indigenous instruction is practical and it is achieved through "apprenticeship and initiation ceremonies" (Darko, 2014, p. 194). The local people identified experts to teach advanced training such as Africansmiths (Indigenous experts in tool making such as making hoes and axes) to the indigenous apprentices (Darko, 2014).

Indigenous instruction is based in the community. Learners and the whole community are involved in the creation of knowledge (Battiste & Henderson, 2002; Darko, 2014; Iseke & Desmoulins, 2015; Mahlatsi, 2017; Seehawer, 2018; Shizha, 2014). In Western Canada, Graham and Ireland (2008) found that, the elderly people taught IK in the schools. Mpofu et al, (2014) acknowledges that, elders were the fountain of IK within the communities. In the study data generation was derived from the elders as they were regarded as the holders of IK.

Indigenous instruction entails the use of various teaching strategies. The elders adopted a variety of teaching strategies during the community lessons (Battiste, 2002). These strategies used by the elders in teaching children include the use of music and folktales (Darko, 2014; Mapara, 2009; Mosweunyane, 2013; Padmasiri, 2018). According to Darko (2014), the use of various teaching strategies such as dances and songs is meant to inculcate practical education and building of character among the indigenous scholars.

2.5.3 Local language as the medium of instruction

Several scholars (Akeinhead & Michell, 2011; Akena, 2012; Kaya & Lyana, 2014; Khupe, 2014; Lukong, 2016; Mawere, 2015; Msimanga & Lelliot, 2013) have indicated the importance of using the local language and local terms as the media of instruction and as a way of decolonising the curriculum. In Canada, Dennis (2010) found that, indigenous language was used in integrating IK in teaching. Kaya and Lyana (2014) and Lukong (2016), further observed that, learners were more articulate and expressed themselves fluently when they used their indigenous dialect in explaining concepts. In support of this assertion, Khupe (2014) revealed that, African learners in South Africa articulated learning concepts better when using isiZulu in their learning. In Uganda, the use of the local language in teaching was viewed as a way of decolonising the coloniser's dominant language (Akena, 2012). Mawere (2015) supports the

use of local language as a medium of instruction as a way of reclaiming cultural identity reflected through language. In Cameroon, the use of the local language in teaching was meant to revitalize the local language which was which was almost extinct (Lukong, 2016). Finally, United Nations (2007) article 14, on the rights of the indigenous people, empowered indigenous people with the right to acquire education in their local language. It is against this background that the research focused on the use of local languages and terms in the teaching of weather and climate in secondary school's Geography curriculum. Apart from decolonising the Geography curriculum, the use of the local language as a medium of instruction, allows learners to express themselves with ease and understand geographical concepts (Kaya & Lyana, 2014; Khupe, 2014)

2.5.4 *Ubuntu/Unhu* (the foundation is the community) education

Indigenous instruction is characterized by *ubuntu/unhu* ethics that grows a child to a complete being (Darko, 2014; Mahlatsi, 2017; Makuwira, 2008). It is asserted that *Ubuntu* education is possible as elders in the community can pass on IK to the youngsters (Mahlatsi, 2017).U*buntu/unhu* education acknowledges the function played by each member in the community (Mubangizi & Kaya, 2015; Odora-Hoppers, 2017). The success or failure of an individual is attributed to the community (Ndondo & Mhlanga, 2014). An individual is part of the community in which there is "reciprocal, interdependence and mutuality among the members in the community" (Oviawe, 2016:3). Mahlatsi (2017, p.96) emphasised the role of the community in *ubuntu* education by observing that, "communal values are regarded more important than individualism". Further, *ubuntu* education values fairness whereby values such as caring and sharing are cherished (Lefa, 2015; Ndondo & Mhlanga, 2014). *Ubuntu* encourages children to be respectful and practice fairness in their daily lives (Mahlatsi, 2017).

Ubuntu instruction has been regarded as a vehicle of decolonizing the curriculum and producing relevant education to the society (Oviawe, 2013). Its focus is to produce a complete human being within the society (Mutekwe, 2015; Oviawe, 2016). Mutekwe (2015, p. 1294) concurred with the principles of *ubuntu* by noting that "Africa as a whole should produce a total person with *unhu or ubuntu* who are loyal, productive and responsible." Across the border, the Department of Education in South Africa views *ubuntu* education as a conduit of instilling history and heritage education to the learners (Department of Education, 2014). The view of

the Department of Education in South Africa is that of supporting the need for integrating and teaching IK in the secondary schools.

The understanding of *ubuntu* education is important to this study as the teaching of IK in Geography is derived from some of these characteristics. The practical application of IK, teaching methodology and character building (developing a person with ubuntu values) of IK are important in the teaching of weather and climate in Geography in the secondary schools as these are important to the community.

2.6 Indigenous Knowledge and Western Science converge

The above two forms of knowledge show some differences in the way they use to acquire knowledge (Agrawal, 1995). Barnhardt and Kawagley (2005, p.11) pointed out, "Western Science (WS) is compartmentalized, de-contextualized and restricted to the classroom". On the other hand, IK is based on direct experience with the natural environment (Dreyer, 2018; Le Grange & Ontong, 2018; Mawere, 2015). Indigenous people learnt from observing their environment (Dreyer, 2018; Mawere, 2015). However, Stephens (2000) has argued that, the two forms of knowledge have a common area where they meet.

More so, the indigenous people believe in spirituality to explain some phenomena (Dei, 2013; Iseke & Desmoulins, 2015; Khupe, 2014). Ancestral spirits are believed to influence what happens to the living such as drought and diseases (Baker, et al., 2011). The understanding of the role of the ancestors to the living world is important in explaining the actions and culture of the indigenous people, for example the preservation of certain trees and forests in which the indigenous people believe their ancestors stay in these natural objects (Baker, et al., 2011; Jegede, 1999). Furthermore, the indigenous people perform rainmaking ceremonies in which they pour some beer on the ground as way of appeasing the ancestors who in turn bring in some rains to the community (Arunotai, 2006). The understanding of the belief systems of the indigenous people of Manicaland is important in the teaching of IK related to weather and climate in the secondary schools since learners bring to the classroom, knowledge gained from their home experiences, a view shared by Ndlovu et al. (2019).

Unlike the classified nature of western concepts of knowledge, IK is regarded as all-inclusive in nature and proved through daily life practices (Stephens, 2000). Western knowledge is further viewed as being "open, systematic and objective" (Agrawal, 1995, p. 3). According to Jegede (1999, p.125), WS seeks "empirical laws and principles". In WS, objectivity and the need to prove facts is very important (Barnhadt & Kawagley (2005).

It is argued that whereas experiments are essential in the western view of knowledge, IK is proved by its ability for the community to survive within the environment (Barnhadt & Kawagley, 2005; Jegede, 1999). A good example in which IK has been proved to survive within the environment is its ability to predict weather using indigenous ways. Barnhardt and Kawagley (2005, p.11) observed that indigenous societies have "mastered their environment which they use to predict weather." The other difference lies in the way knowledge is transmitted. Jegede (1999, p.125) opines that IK is "orally transmitted and communal owned," as opposed to documented Western learning which is based on individualism.

Stephens (2000) as illustrated in Figure 2.1, has shown that, both forms of knowledge changes with time. The two forms of knowledge involve acquiring skills and making use of plants and animals. *Ubuntu/unhu* values are key to both forms of knowledge (Stephens, 2000).

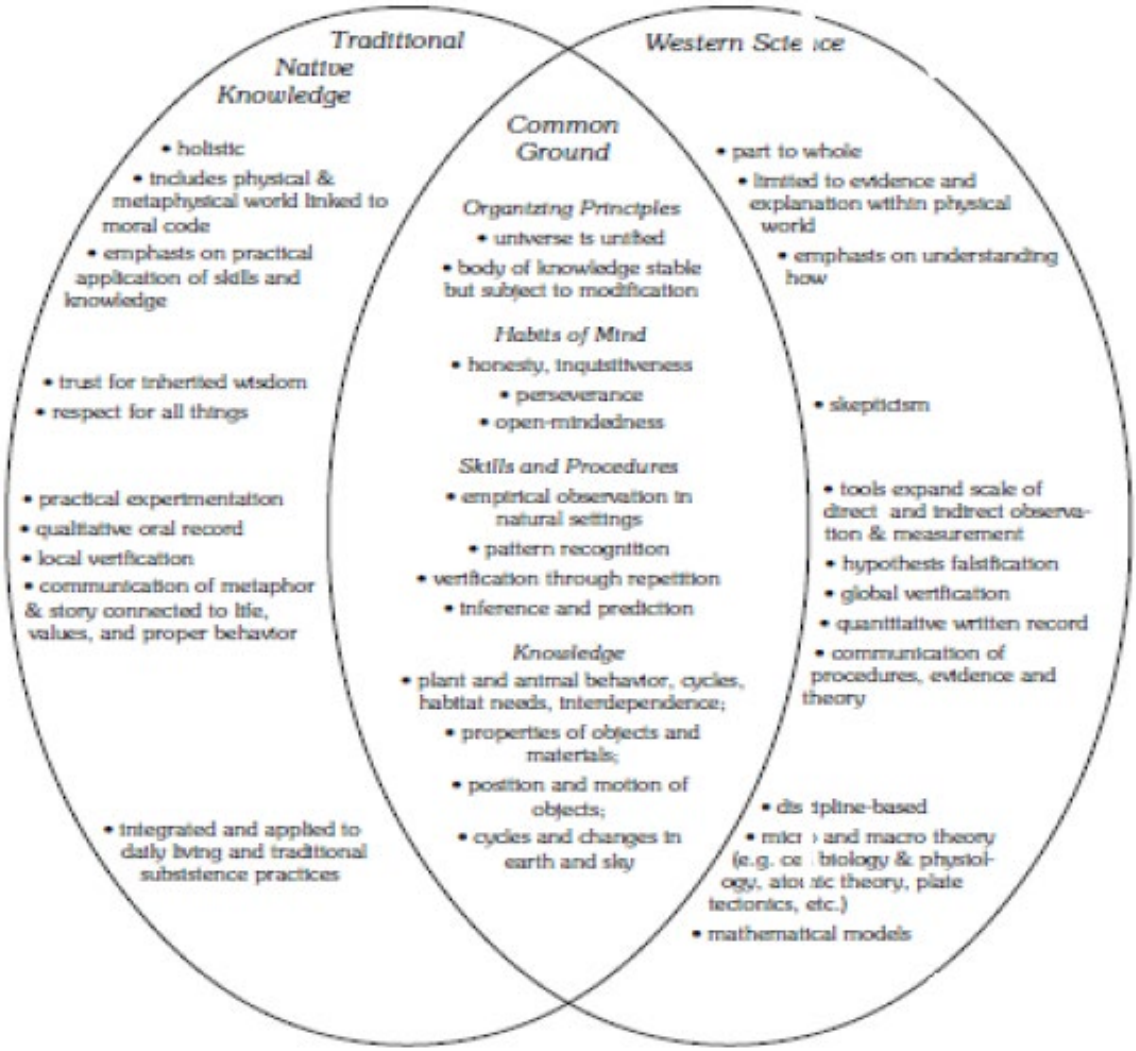

Figure 2.1: Indigenous and WS converge

Source: Stephens (2000, p. 11)

Although there may seem to be some "differences in the two forms of knowledge, there are areas of convergence" (Stephens, 2000, p. 11). These areas of convergence in the two forms of knowledge provide the need for integrating IK in the teaching of weather in the classroom context. For example, both forms of knowledge have weather forecasting and these can be integrated and taught together. Baker et al, (2011) observed that, both forms of knowledge change over time and use observation and recurrence of actions to explain phenomena.

2.7 The Value of introducing IK in the Geography curriculum

Local knowledge plays a significant role for the learners and the community. Dreyer (2018) and Breidlid (2009) observes that, IK allows educators and learners to associate themselves with learning experiences through the use of indigenous examples in the classroom. When learners associate what is learned from school with their experiences in the community, learning becomes more interesting (Mawere, 2015; Tsindoli, 2019). Further, Mawere (2015, p. 61) urged for IK integration in the school curriculum as the application of prior knowledge by the learner promotes, "innovative thinking and constructivism." The learners are able to develop new ideas and provide solutions to environmental problems. In addition, Nakata (2003) argues that, integrating IK into the school system promotes the production of new knowledge and a curriculum that caters for everyone. Dei (2000, p, 120) concurs by pointing out that integrating IK in education was "a way of acknowledging that different forms of knowledge are complementary and co – exist." Dei's assertion, justifies the need for teaching both IK and Western science in Geography in secondary schools. Govender, Mudaly & James (2016) viewed this concept of teaching both IK and WS as hybridisation of knowledge. The integration of IK in secondary school Geography is therefore meant to complement the knowledge systems available to the learners. In Kenya, for example students were found to perform better when learning was related to the learners' local experiences (Dennis, 2010). Ndlovu (2019) observed that, learners comprehend new concepts if learning put into consideration the indigenous context of the learner. On the contrary, Brayboy and Maaka (2015) noted that, failure to incorporate the culture of the indigenous learners in schools was a barrier in the progression of indigenous students in institutions of higher learning.

The integration of IK in the classroom is conceived as a way of decolonising knowledge and promoting a national legacy (Aikenhead & Michell, 2011; Le Grange & Ontong, 2018; Mawere, 2015; Seehawer, 2018). In addition, Mawere (2015), views the teaching of local language and history in the classroom as a strategy of promoting the identity of a nation. Scholars such as Iseke and Desmoulins (2015) and Shizha (2006), opined that, the integration of IK into the curricula was a way of empowering educational stakeholders in the education system because IK integration into the education system allow teachers to interact with the communities (Govender et al., 2016; Iseke & Desmoulins, 2015; Mcleod, 2014). Mawere (2015) also argues that, the incorporation of IK in the school syllabus is empowering, as it allows learners to make their own decisions and determine their future.

The report by the Nziramasanga Commission in Zimbabwe advocated for a curriculum that embraces *unhu/ubuntu* morals (Government of Zimbabwe, 1999). However, Mungwini (2013) and Sigauke (2016) believe that, *ubuntu/hunhu* benefited only politicians who forgave each other soon after independence by spreading the values of *ubunhu/unhu* to the electorate. Mungwini (2013, p. 783) further asserted that, "the current education system in Zimbabwe has divorced the ideals of indigenous education that valued community cooperation by teaching in school's liberalism that promote individualism and competition." The assertion supports the integration of IK in the teaching of weather and climate in the secondary schools as this would allow the teaching of *unhu* morals in the classroom.

Various authorities have shown that IK integration is critical in teaching learners. The integration of IK in the teaching of Geography does not only benefit the learner but also benefits the community. It is these personal, community and national values that the study sought to explore in the ways of integrating IK in the teaching of Geography in the secondary school sector.

2.8 British education system in Zimbabwe

This section explores the nature of the British education and how it impacted the Africans in Zimbabwe. The British education system adopted in Zimbabwe regarded indigenous practices as retrogressive and aimed at promoting the interests of the colonial rule (Nherera, 2000; Shizha, 2006). In contrast, Eurocentric knowledge was believed to be of high quality (Nherera, 2000; Shizha, 2006). The curriculum for Europeans was developed in such a way that, it prepared future leaders in industry and Government offices, whereas the education for the Africans was meant to provide a source of cheap labour in the colonies (Mavhunga, 2006; Nherera, 2000; Siyakwazi, 1996). Furthermore, the colonial education disempowered the Africans to be in control of their lives (Shizha, 2006). The nature of the relationship that the colonialists had on indigenous Zimbabweans was described by Zvobgo (1999) as detrimental to the Africans. Some of the Africans who acquired westernised education used it to oppress their countrymen and women (Mavhunga, 2006; Shizha & Kariwo, 2011).

The Africans were disadvantaged and dominated through Missionary education[5] that was introduced to them (Shizha & Kariwo, 2011). The Africans were offered minimum education so that they could provide a cheap workforce in the industries that were owned by the white population. The Africans were not involved in decision making in all facets of the economy (Shizha, 2005; Siyakwazi, 1996; Zvobgo, 1996).

The colonial rule in Zimbabwe had unfair policies that deprived the Africans, for example schools for the whites in Zimbabwe were government funded whereas education for the Africans survived through aid from missionaries (Government of Zimbabwe, 2005). In pursuance of the colonial agenda in Zimbabwe, the Anglican missionaries established the first secondary school for the Africans at St. Augustine near Mutare in 1939, whereas the government built its own secondary school called Goromonzi near Harare (Zvobgo, 1997).

Access to education in Zimbabwe prior to independence was limited and controlled. The colonial government ensured that no more than 12.5 % of primary graduates progressed to secondary education through rigorous grading system (Government of Zimbabwe, 2005). Only those who passed with first- or second-class division in their primary final examinations proceeded to secondary education (Government of Zimbabwe, 2005). Those who would proceed were grouped into academic schools commonly referred to as the F1 system that catered for the brightest students and industrial (F2 system) schools were established for the less academically exceptional students (Government of Zimbabwe, 2005). This system created many dropouts who have provided a cheap workforce in industry. The colonial education system allowed only 2, 5% of learners to continue with their education to advanced level. Only a small percentage, namely 0, 2% competed for places at the University College of Rhodesia and Nyasaland [6](Government of Zimbabwe, 2005; Mavhunga, 2006; Shizha, 2006).

[5] Missionary education were activities carried out by churches within the society and in the schools. In Zimbabwe Missionary education was mainly provided to the indigenous people with the aim of perpetuating the dominance of colonial rule over the indigenous people (Shizha & Kariwo, 2011).
[6] This was the only University in Zimbabwe prior to independence

The state of education for Africans was worsened by the 1979 Education Act which categorized schools into categories according to race (Shizha & Kariwo, 2011). Group A was for the whites only and group B for the Africans who were located in designated African residential areas. Group C schools were non fee-paying schools which were established in the rural areas (Atkinson, 1972). The stringent education requirements ensured that Africans were not academically equipped enough to compete with the whites for employment. It also created social classes within the Zimbabwean community (Atkinson, 1972; Mavhunga, 2006; Shizha & Kariwo, 2011).

The scenario narrated above, justifies the rationale for integrating IK into the existing Geography curricula in secondary schools in Zimbabwe. It is the argument of this study that, education should be relevant to the local indigenous communities. Education must equip and empower learners with skills to make decisions that improve people's lives and affirms them. It is proposed that education should be culturally grounded in IK practices, a feature which is deficient in the current Zimbabwe School Examination Council (ZIMSEC) Geography syllabus[7] (2015-2022). The study can therefore fill this missing gap by integrating IK content and methodology into the teaching of weather and climate in Geography in the secondary schools.

2.9 The post-colonial education system in Africa

In the previous section, the nature of colonial education and how it impacted upon Africans in Zimbabwe was outlined. The current discussion considers how African governments made reforms in education as they tried to redress imbalances in the colonial education system and its negative effects on indigenous people.

Most curricula in Africa are a duplication of a Western curriculum in which IK has been largely ignored (Mavhunga, 2006; Shizha, 2010). In Rwanda, post-colonial changes in the curricula were undertaken with the help of specialists from Canada. In Egypt and Sierra Leone their respective curricula have been influenced by organizations such as the United Nations

[7] The Geography syllabus covers work from forms 1 to form 4

Education Scientific and Culture Organization (UNESCO) and the World Bank (Hassan, 1997; Shizha, 2010). The curriculum is therefore divorced from the local context of the nations that are involved.

Indigenisation of the curricula received resistance from policy makers who believed that Eurocentric education was superior (Nyamnojoh, 2012). Parents also believed that by sending their children to private schools offering a European curriculum, it would enhance their children's opportunities in the job market (Nyamnojoh, 2012). In 1968, Nyerere recognised this discordance in what was learnt in the formal classroom and the community's indigenous culture. In order to close the gap, he recommended the fusion of home knowledge[8] with school knowledge[9]. Mhlauli (2012) observes that, Nyerere's philosophy was based on the respect of human life and fairness. It aimed at producing school graduates who were responsible and able to solve societal problems (Mhlauli, 2012). The aim of ujamaa (Ujamaa- education that values indigenous education, human rights and fairness in the distribution of resources) was to promote socialism whereby every citizen would benefit from the national resources (Mhlauli, 2012). However, even after localization of the education system in Tanzania, the content of science and mathematics in the secondary schools remained a replica of Western education, characterized by minimum integration of local knowledge (Shizha, 2010).

In Malawi, Banda, the former President of Malawi constructed the Kamuzu academy that enrolled foreign teachers from Britain to teach at the institution (Nyamnojoh, 2012). The institution imported all learning materials from foreign countries. Worse still, the students would not be allowed to speak in their local Chichewa dialect (Nyamnojoh, 2012). In East African countries, inquiry science[10] curricula were derived from Western countries (O-Saki, 2007). In South Africa, IK was introduced through curriculum changes after it became independent (South African Department of Education, 2002).The inclusion of IK into several democratic curricula: the new curriculum referred to as Curriculum 2005 (Vhurumuka &

[8] This is IK which people of a particular community has acquired over time and used for their survival.
[9] School knowledge refers to westernised education acquired from a school set up
[10] Ways in which scientists offer explanation to a problem or question based on evidence gathered from their research"

Mokeleche, 2009) and later curricula such as the revised national curriculum and the latest Curriculum and Assessment policy statement has been a result of a need to change apartheid wrongs, inequalities and to meet the requirements of a multiracial society. The Botswana government after attaining its independence, aimed at promoting democracy equipping learners with knowledge, skills and values that achieve personal development (UNESCO, 2010).

The Kenyan President, Jomo Kenyata, implemented community self-help schools aimed at developing unity and to fight against racial disparities inherited from the colonial form of education (Mhlauli, 2012). However, despite some positive aspects to address the colonial imbalances in education, the schools were criticized for producing irrelevant graduates for the country's economy (Mhlauli, 2012).

The above discussion demonstrates that post independent African governments faced some successes and failures in an effort to change the Westernised curricula. There was resistance among the political leadership and the elite classes who still believed in a western education (Shizha, 2006). The post independent education systems were also largely sponsored by European countries thus making the curriculum changes, a duplicate of the Eurocentric education (Shizha, 2006; Mavhunga, 2006). Shizha (2006) and Sigauke (2016) further argued that, the current education system in Zimbabwe has done very little to incorporate students' indigenous experiences and background in the classroom context. The elements of Western education are still demonstrated through the use of foreign textbooks, and the use of English as a medium of instruction (Mavhunga, 2006; Shizha, 2006).

In Zimbabwe, the Ministry of Primary and Secondary Education developed a Curriculum Framework for Primary and Secondary education 2015 – 2022 (Government of Zimbabwe, 2015). Thus, the Government is currently reviewing the school curriculum. This study elicited the views from the teachers and community elders regarding the integration of IK in the teaching of weather and climate in Geography in the secondary schools. The findings from the study might assist policy makers in the current curriculum review process. The findings can add more IK knowledge to the Geography curriculum which is rather limited.

2.10 IK on weather and seasonal forecasting

A brief review of the literature on indigenous methods used to study weather and seasonal patterns in Zimbabwe and beyond are discussed in this section.

Indigenous people have over time used biological, natural and the spiritual world to predict weather in order to plan their daily and seasonal activities (Achrya, 2011; Chand, Chambers, Malsale & Thompson, 2014; Changa'a Yanda & Ngana, 2010; Dei, 2013; Kaya & Koitsiwe, 2016; Makwara, 2013; Mapara, 2009; Mhita, 2006; Muguti & Maposa, 2012; Okonya & Kroschel, 2013; Pareek & Trivedi, 2001; Siambombe, Mutale & Muzingili, 2018; Shoko, 2012).Changes in flora and fauna has been used to predict weather changes as observed by Mhita (2006) in Tanzania; Kaya and Koitsiwe (2016) in Botswana and South Africa; Galasgac and Balisacan (2003) in the Philippines; Okonya and Kroschel (2013) in Uganda. Changes in the behavior of animals and insects has been commonly used by indigenous people to forecast weather as well (Archarya, 2011; Chand et al., 2014; Okonya & Kroschel, 2013; Siambombe, et al., 2018).

Similarly, in Zimbabwe, Mapara (2009) in a study by Tangwena people in Nyanga noted that, the people predicted weather by observing the changing behaviour of birds. Of particular importance Mapara (2009) observes that, when the bird called *dzvotsvotsvo (*rain bird) squeaks that signified the coming of the rainfall within a short period of time. Mapara (2009) further observed that, when fowls come out to feed when it is raining, it was a good indicator that the rains would last for a very long period. The use of biological indicators to predict weather was further confirmed by Muguti and Maposa (2012) in their studies of the south- eastern parts of Zimbabwe and Shoko (2012) who studied how the local people of Mberengwa in Zimbabwe used flora and fauna to predict weather.

In Burkina Faso, indigenous people used ancestral spirits and dreams to forecast weather (IPCC, 2007). In western Kenya, indigenous weather forecasting is confined to the Nganyi clan who have sacred shrines and who use local trees to forecast weather patterns (Thomson Reuters Foundation, 2012). Arunoti (2006), in Malawi reported that the local people offered beer to the ancestors by pouring it onto the ground to appease them in return for rainfall that was required for the crops.

Various forms of IK have been used worldwide to predict weather and seasons. Despite the usefulness of IK on weather and climate studies, very little has been done to include this knowledge in the Geography syllabus in Zimbabwe. In a similar study, Ndlovu (2019), observed that, there was very little IK in the Agriculture curriculum in Zimbabwe. This current study therefore aimed at exploring the ways in which more IK could be integrated into the teaching of the topic on weather and climate in secondary schools in Geography.

2.11 Weather and climate studies

The terms, weather and climate are explained in this section. The explanation of various elements of weather and climate and their relevance to the study are expanded upon.

2.11.1 Definition of weather and climate

Weather is the condition of the atmosphere at any specific time. The weather conditions therefore vary over time and space. The conditions that vary include temperature, precipitation and cloud cover (Barry & Chorley, 2003). On the other hand, meteorology is the science that is concerned with atmospheric processes and phenomena. The purpose of meteorology is to forecast weather and to explain the processes that occur within the atmosphere (Barry & Chorley, 2003; Lutgens & Tarbuck, 2010). On the contrary, climatology is the study of the average weather conditions at a given place and time over a long period of time (Aguado & Burt, 2010; Lutgens & Tarbuck, 2010). The concept of weather and climate are important in the study. The study explores how the weather elements are used to measure and predict weather by the indigenous people of Manicaland in Zimbabwe.

2.11.2 Weather elements and their measurement

Weather elements are those aspects used to describe the condition of the atmosphere. These elements include temperature, rainfall, clouds and wind (Barry & Chorley, 2003). It is necessary to note how these weather elements are measured in the western tradition, as is illustrated in Table 2:1.

Table 2.1: Weather Instruments and their measurement

Weather element	Instrument used to measure the weather element	Unit of measurement
Temperature	Maximum and Minimum thermometer	Degrees Celsius
Rainfall	Rain gauge	Millimeters
Wind speed	Cup anemometer	Km/ hr
Wind direction	Wind vane	Compass
Humidity	Hygrometer	Mm/cubic of air
Cloud cover	Observation and estimation	Oktas
Sunshine	Sunshine recorder	Hours of sunshine

Source: Adapted from: Barry & Chorley (2003) and Buckle (1996)

2.11.3 Air masses

An air mass is a large volume of air with the same characteristics in terms of weather elements. It can affect the temperature over the areas as they pass through and in turn, it can be affected as well (Barry & Chorley, 2003). In Zimbabwe, these air masses that affect Zimbabwe are the south east trade winds which are moist and they can bring some rains. The north east trade Winds are generally dry. Both the south east and north east trade winds converge within the equatorial region where there is low pressure (Buckle, 1996). This low-pressure zone is called the Inter -Tropical Convergence Zone (ITCZ). It is caused by intense heating as a result of the overhead position of the sun (Barry & Chorley, 2003; Buckle, 1996). The changes in the position of ITCZ also cause seasonal variations. When the ITCZ is in the northern hemisphere in July, it brings some rains in the northern regions. The low-pressure zone shifts to the south from November thereby signaling the beginning of the summer season in the southern hemisphere (Barry & Chorley, 2003; Buckle, 1996).

It is important to note that, indigenous people have their own explanation for the coming of the rains and patterns of air movement. This is the subject of discussion in Chapter 4. It is therefore important to integrate conceptions of community elders and teachers regarding air movement and the occurrence of rains during the teaching of geography concepts as these same perceptions are possibly brought into the classroom by the learners. Shizha (2014, p.1871) argues that, "students in Africa need to learn about their own sociocultural existentialities, histories and ways of life, traditions and practices before they learn foreign cultures." The prior experience that learners have is important in mastering new ideas. Khupe (2014) observes that the previous experience of learners can be used to enhance the understanding of scientific ideas.

2.11.4 Types of clouds

Another phenomenon which is relevant in the teaching of weather, is that of clouds. Clouds are minute droplets of water vapour which form in the atmosphere (Barry & Chorley, 2003). Clouds form when there are adequate hygroscopic nuclei in the atmosphere, enough moisture and adequate cooling of the water vapour (Barry & Chorley, 2003; Buckle, 1996; Lutgens & Tarbuck, 2010). In a western Geography curriculum, the explanation is that there are different types of clouds in the atmosphere that are classified according to their formation, shape, moisture content, and height above the ground surface (Barry & Chorley, 2003; Lutgens & Tarbuck, 2010). The types of clouds and their relevance to the study will be discussed in this section.

There are high level clouds which are located more than six kilometers above the ground surface. These consist of cirrus, cirrocumulus and cirrostratus clouds. Cirrus are wispy, feathery and whitish. They yield no precipitation (Waugh, 2009). Cirrocumulus clouds are composed of thin layers of small bulbous masses whereas cirrostratus clouds are thin layered and may show sun or moon halo. Cirrostratus clouds may herald the coming of a warm front which is characterized by some rain in the coming few weeks (Barry & Chorley, 2003; Grace, 2008).

There are middle level clouds that range from a height of two (2) kilometers to six (6) kilometers. These consist of altocumulus and altostratus clouds (Buckle, 1996). Altocumulus

are greyish clouds composed of water droplets and ice crystals. They yield some small amounts of rain. Altostratus clouds are uniform, thin and greyish in colour. They can produce some significant rains (Barry & Chorley, 2003; Buckle, 1996; Lutgens & Tarbuck, 2010).

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The third category consists of low-level clouds from the ground surface up to two (2) kilometers high. There are cumulonimbus clouds which stretch from near the ground surface up to six (6) kilometers or higher (Barry & Chorley, 2003; Waugh, 2009). They are dark gray and can result in intense rainfall characterized by thunder and lightning. Nimbostratus clouds are thin dark gray clouds that produce continuous rain (Barry & Chorley, 2003; Buckle, 1996; Grace, 2008).

The westernised description of the types of clouds is relevant to this study. Indigenous people of Manicaland have their local names and terms for describing clouds. They also know how each cloud type is related to weather conditions. Scholars (Chang'a, Yanda &Ngana, 2010; Mhita, 2006; Muguti & Maposa, 2012; Shoko, 2012) have shown how the local people have always used their local environment to predict weather conditions. Local terms used by Manicaland community to describe types of clouds as well as using these clouds to predict weather is important in the teaching of the topic, weather and climate in the secondary schools. In chapter 4, the study presents how local language used by indigenous people to describe different types of clouds, can feature in the teaching of weather and climate in Geography in secondary schools. The knowledge of cloud types is also important in the study as the different types of clouds are used by the indigenous people to predict weather. There is therefore a common ground that calls for the integration of indigenous and western knowledge in the teaching of weather and climate studies in Geography in the secondary schools (Stephens, 2000).

2.11.5 Types of Rainfall

Rainfall is another phenomenon which resonates with the need for integration. Rainfall is precipitation in liquid form. There are three main types of rainfall namely orographic, convectional and frontal. Their formation and spatial distribution are a combination of factors and processes which are outlined below.

2.11.5.1Orographic rainfall

This is rainfall that is caused by the forced uplift of cool moist air especially along the coastal regions. Rainfall occurs on the windward side due to the uplifting of air that results in adiabatic cooling. On the leeward side there are dry conditions caused by adiabatic warming (Barry & Chorley, 2003; Buckle, 1996; Waugh, 2009). The forced uplift of air explains the occurrence of rainfall in mountainous areas such as Chimanimani, Vumba and Nyanga in Zimbabwe (Barry & Chorley, 2003).

2.11.5.2 Convectional rainfall

Conventional rainfall is due to the intense heating of the ground surface that forces the air to rise. The air gets adiabatically cooled (Waugh, 2009). The rising air finally reaches condensation level. This causes heavy downpours associated with thunder and lightning (Barry & Chorley, 2003; Waugh, 2009). The type of rainfall is largely experienced in hot regions such as Save and the Zambezi valley where there is intense heating of the ground surface.

2.11.5.3 Frontal rainfall

This type of rainfall is caused by the convergence of two air masses with different characteristics (Barry & Chorley, 2003; Waugh, 2009). The warm tropical air mass is forced to rise over the cool dense air from the polar regions. Air mass convergence explains rain formation in the low-pressure zones in the tropics and the temperate regions (Aguado & Burt, 2010; Barry & Chorley, 2003; Waugh, 2009).

The understanding of the formation and types of rainfall is important in this study. Local people of Manicaland have their own classification and explanation of rainfall types as is detailed in chapter 4. Local people explain rain formation as a result of the influence of the ancestral spirits. On the contrary, western knowledge explains the occurrence of rainfall through processes such as forced uplifting of air masses (Aguado & Burt, 2010; Barry & Chorley, 2003; Waugh, 2009). It is of interest how IK brings new knowledge to the study of rainfall types, their classification and development. This knowledge could be integrated in the teaching of weather and climate in Geography in the secondary schools

2.11.6 Weather and Climate hazards

Weather and climate hazards are threats to the human and physical environment brought about by atmospheric processes. These hazards include droughts, cyclones, floods and climate change (Aguado & Burt, 2010; Christopherson, 2012). One of the atmospheric hazards is droughts. Lockwood (2008, p. 97) describes a drought as "a period of abnormally dry weather conditions." It can be caused by both physical and human factors. The major cause of a drought is the El Nino phenomenon, a situation where "there is reversal of wind patterns between the western and eastern pacific" (Lockwood, 2008, p. 105). If the Pacific Ocean has a low pressure due to high temperatures, air masses converge in the Pacific causing some rains there (Barry & Chorley, 2003). If the air masses blow away from Zimbabwe, a condition of El Nino is created. Conversely La- Nina is the reverse process in which there is convergence of air masses in Zimbabwe due to cool temperatures over the Pacific that causes high pressure (Barry & Chorley, 2003; Lockwood, 2008).

Another important hazard in the study is that of cyclones, a system of intense low pressure. (Barry &Chorley, 2003; Buckle, 1996; Waugh, 2009). Cyclones develop in tropical warm oceans where there is very high evaporation as a result of abundant moisture over the oceans. The smooth surfaces of oceans contribute to very high wind speeds in the coastal areas (Barry &Chorley, 2003; Waugh, 2009). Once the cyclones reach the land surface, the high frictional drag of the land surface reduces the wind speed. Cyclones are very destructive for example cyclone IDAI in Zimbabwe in 2019 that caused massive destruction of infrastructure such as bridges, houses and displacement of people in Chimanimani and Chipinge Districts of Zimbabwe. The increasing negative effects of atmospheric hazards calls for a greater need to incorporate indigenous methods of weather prediction in the teaching of Geography in secondary schools. Combining indigenous and modern weather forecasts produces more effective forecasts for disaster management (Thomson Reuters Foundation, 2012).

Climate change is yet another environmental hazard. It refers to a change of climate that is attributed to human and natural factors over a long period of time (Barry & Chorley, 2003; Christopherson, 2012; Waugh, 2009). Evidence of climate change includes frequent drought, extreme temperatures, melting ice, flooding, extinction of plants and animals (Barry & Chorley, 2003; Christopherson, 2012; Waugh, 2009).The negative effects of change of climate

are more felt in those regions with poor technology and a lack of adaptative measures such as irrigation (Barry & Chorley, 2003; Christopherson, 2012).

The understanding of western conceptions on the influences on weather and climate in the teaching of Geography are important in this study. The local people of Manicaland have their understanding and explanation of weather and climate phenomena. It therefore means that, learners may possess their own knowledge stemming from their community pertaining to the influences of weather and climate. Aikenhead (1996) referred to this as, "cultural border crossing in which students are equipped with their own knowledge which is different from what could be taught in the Geography classroom. Aikenhead (1996) therefore suggests that, teaching requires strategies to overcome the cultural challenges. In this study, the cultural challenges could be overcome through integrating IK in the teaching of weather and climate in the secondary schools. Hatcher, et al. (2009) argues for a cultural bridge in which the strengths of both IK and Western forms of knowledge are considered in assisting the learners to acquire new concepts. This study solicited the conceptions of the community elders and teachers regarding their understanding of atmospheric processes. These conceptions are topical when it comes to integrating IK and Western forms of knowledge in the classroom teaching of weather and climate in Geography in the secondary schools.

2.11.7 Modern Methods of Weather Forecasting

Weather forecasting is "a statement of weather expected to occur in a particular area during a stated time period" (Buckle, 1996, p. 218). Modern weather forecasting uses technology such as super computers and satellite images to predict weather (Barry & Chorley, 2003; Buckle, 1996; Lutgens & Tarbuck, 2010). In Zimbabwe this is the only form of weather forecasting that is broadcasted on both televisions and radio stations. The indigenous ways of forecasting have been ignored on the national broadcaster. There are different types of weather forecasting that are used in the modern science such as subjective forecasting (Barry & Chorley, 2003; Buckle, 1996; Lockwood, 2008). In Zimbabwe, modern weather forecasting is done by the Meteorological Services Department in Belvedere, Harare using technology such as satellite images. It is expensive since it requires high levels of technology and expertise (Barry & Chorley, 2003; Buckle, 1996; Lutgens & Tarbuck, 2010). It is therefore a challenge to Less Developed Countries (LDC's) such as Zimbabwe (Buckle, 1996). There is also medium range weather forecasting that covers a period from a few days up to two weeks (Lutgen &Tarbuck,

2010: Buckle, 1996). Weather prediction for more than a month is regarded as long term weather forecasting (Barry & Chorley, 2003).

The review of literature on modern weather forecasting is important in this study. Local people of Manicaland use indigenous methods of weather forecasting for their daily activities. Weather forecasting lies at the heart of the local community as their knowledge is important in their activities such as farming, hunting and domestic chores (Makwara, 2013; Mapara, 2009; Muguti & Maposa, 2012; Shoko, 2012). Further, the knowledge on indigenous methods of weather forecasting is important since it constitutes the content on IK that could be integrated in the Geography curriculum and it can feature in the teaching of weather and climate in the secondary schools (see chapter 4).

In Western Kenya, weather predictions by local people is combined with predictions from the Kenyan Meteorological Department for them to get reliable weather forecasts (Thomson Reuters Foundation, 2012). This idea of combining the two forms of knowledge have been employed in Australia to cater for the inaccuracies in weather forecasting due to variations in microclimates (Bureau of Meteorology, 2010). Furthermore, the use of IK is of prime importance in Less Economically Developed Countries (LDC's), where there is a challenge of accurate weather forecasts as a result of poor technology and inadequate data on weather forecasts (Aguado & Burt, 2010; Buckle, 1996; Grace, 2008; IPCC, 2007).

The discussion on modern weather forecasting and challenges are relevant to my study in the sense that they point to a need for complementary data to improve on the reliability of weather forecasting.

2.12 Approaches that may be used to integrate IK in the school syllabus

There are various approaches that can be employed to integrate IK within the current Geography syllabus (2015-2020). These approaches are briefly explained in this section.

The first approach is that of incorporating relevant IK in the teaching of weather and climate. With this approach, only IK that is related to WS is integrated in teaching (Naidoo & Vithal, 2014). This approach does not take IK as equal to WK. The Western form of knowledge is viewed as superior.

There is also a separatist approach to IK integration. The approach assumes that both IK and WK are useful and at par, but they have to be taught separately in the classroom (Msila, 2009; Naidoo & Vithal, 2014; Ndlovu, 2019; Yishak & Gumbo, 2014). The approach however, views the two forms of knowing as different since they are taught separately (Naidoo &Vithal, 2014). Yishak and Gumbo (2014) that IK and WK integration should take place in phases. Initially IK is taught separately and then blended with WK when it is well established.

Further, there is the integrationist approach which integrates IK and WK in the teaching of a subject. The two forms of knowledge are regarded as equally important. The important elements from either side are chosen and taught in the classroom together (Hatcher, et al., 2009; Msila, 2009; Naidoo &Vithal, 2014; Ndlovu, 2019; Seehawer, 2018; Zeremarian, 2018). Zeremarian, used the term hybridization of IK and WK in referring to the integrationist strategy, while Ndlovu (2019) referred integrationist approach as blending the two forms of knowledge. Dei (2000) advocated for hybridization of knowledge. This is a concept in which people from different worlds gain knowledge from either side. Dei (2000) views the integration of IK into the education system as a way of decolonizing knowledge and culture in different geographical areas. Further, Aikenhead (1996) proposed the concept of cultural border crossing in which learners bring to the classroom, their experiences which are dissimilar from what is taught in the school system. He therefore suggested that educators should consider the cultures of the learners for effective teaching to take place.

Diwu and Ogunnyi (2012) employed an integrationist approach in their studies. They acknowledged that there was a point of intersection between IK and Western Science (WS). Scholars (Ndlovu, 2019; Ngcoza, 2018; Seehawer, 2018) further proposed that teachers and learners can acquire knowledge on IK from the community which can be used together with WS.

Different views have been proposed on how IK could be integrated with WS. This study argues for integrationist approach since it acknowledges IK as a form of knowledge equivalent to WS. The study argues that there are aspects of IK knowledge related to weather and climate which can be used to in the teaching of weather and climate for example indigenous ways of weather

forecasting can be taught togetherwhen teaching western science of weather prediction. Jegede (1999, p.133) put forward the concept of "collateral arguing that learners bring to the classroom their home experiences. "Collateral" (Jegede, 1995; 1999) and "cultural border crossing" (Aikenhead 1996, p. 6) are concepts which are applicable to this study as the study seeks to explore learners' experiences and how these can be integrated in Geography when teaching weather and climate in secondary schools. The study recognises that during the process of integrating IK with WS, there are challenges to both the learner and the teacher (research question 3). The study explores how these challenges influence the integration of IK into the teaching Geography in the secondary schools. The experiences which the learners bring to the classroom constitute the study's research question 2 which explores the content that could feature in the Geography teaching of weather and climate in the secondary school sector.

2.13 Views on integrating IK in the school curriculum

There are divergent views on the integration of IK in the school curricula. Many scholars (Carter, 2006; Dei, 2000; Horsthemke, 2004; Le Roux, 2004; Odora Hoppers, 2002) are of the view that WS is not the only way of knowing hence IK should find a place in the education system. Ndlovu, et al. (2019) argued for inclusion of IK in the curriculum on the basis that, learners come to school equipped with prior knowledge which should be considered when teaching. A learner comprehends new concepts when the context of the learner is considered (Ndlovu, et al. (2019). Dreyer (2018) advocated for IK inclusion in the Geography curriculum since this would allow teachers to use the local environment and examples drawn from the school surroundings.

Some scholars (Altieri, 1995; Dei 2000; Kawagley, 1998; Mapara, 2009) argue that, the concept of science as a form of knowledge is debatable since there are many interpretations of what defines knowledge. Dei (2000) conceptualize integration of IK as a way of avoiding colonisation of knowledge and culture in various places. Dei (2000, p. 113) therefore advocated for "hybridity of knowledges." This is an idea in which people from different world conceptions benefit knowledge from either side (Carter, 2006). The researcher therefore argues that, integrating IK into the Geography curriculum allows students to acquire knowledge from different sources and from different world views resulting in a broader understanding of learnt concepts.

Shizha (2010) advocates for the inclusion of IK in the classroom as it equips the learner with life skills for survival. He further argues for the incorporation of IK in teaching so as to make the learning experience relevant and accommodative to the learners' background. Further, Castagno & Braboy (2008); Lipka, et al. (2001) found that, the integration of the learners' experiences in teaching enhances the understanding of taught concepts and participation by the learners in the classroom. More so, the incorporation of IK into the school curricula was found as one way of promoting the worthiness and self-esteem among the learners (Dei, 2000; Ntaragwi, 2004; Dyer, 2006; Shizha, 2014). Mapara (2009) observed that, the importance and value of IK is evidenced by the expertise exhibited by the Great pyramids of Egypt and Great Monuments of Zimbabwe. In addition, Mapara (2009) further observed that the *Shona* people in Zimbabwe demonstrated some scientific principles by using medicinal plants to treat various ailments.

The United Nations Declaration on the Rights on Indigenous People [UNDRIP] (United Nations, 2007) further gave a green light and institutional support for the integration of IK in the school curriculum. Article 31-1 of the UNDRIP, articulates the rights by indigenous people to pass on to their future generations, their tradition and philosophy. Article 14-1 of the same UNDRIP further gave legal power to the indigenous people to have a stake in the establishment of educational institutions which meet the expectations of their culture and language.

Despite many scholars supporting the integration and teaching of IK in the schools, some had contrary views. Cobern and Loving's (2001) believed that, WS was the only objective form of knowledge. Further to this, Sithole (2005) did not see any contribution that IK can make to knowledge generation. Despite the divergent views on the integration of IK in the existing curriculum, many scholars as advanced above, support its integration. It is the intention of the thesis given the findings of this study, to argue for an inclusion of IK in the teaching of weather and climate in secondary schools so that the highlighted benefits can be accrued to the learners and the community of Zimbabwe.

2.14 Cases of IK integration in the Education system

This section discusses various cases of IK integration in schools and in tertiary institutions that have relevance to the study.

2.14.1Case study 1: Conceptions of students on integrating IK at North- West University (Mafikeng Campus) in SA:

North-West University is one of the first institutions of higher learning in South Africa and arguably in Africa to integrate IKS into Higher education at both undergraduate and postgraduate level in 2001.The aim of integrating IKS was to "achieve the sustainable development goals as well as to meet the institutional IK policy" (Kaya, 2013, p.143).

Mmola (2010) carried out research on the views of students regarding the integration of IKS at North West University. It was observed that 80% of the learners supported the introduction of IK, especially the use of the local language while teaching. Lecturers who used the local language, Setswana, in their teaching were able to cite examples from the community (Mmola, 2010). The research also found that, heads of department were happy with students' performance that improved after the incorporation of IKS in teaching. The high performance by students was attributed to learners who were able to link classroom teaching with their home background (Mmola, 2010). Further, Mmola (2010) discovered that, learners had benefited in various ways for future employment. In addition, the learners felt that indigenous education instilled self-esteem amongst them. Community elders and parents around North West University were involved as resource persons. The local community therefore contributed to the knowledge taught to their children (Mmola, 2010).

Although the integration of IKS in teaching was a success at the Mafeking campus of the university, there were some hurdles in the campuses with white majority students. The campuses that were dominated by members of the white population of South Africa perceived a Eurocentric form of education as superior (Mmola, 2010). In addition, North West University was also faced with challenges ranging from human to material resources. Some lecturers who did not understand the linkages between IKS and science and technology resisted the implementation of IK in the classroom (Mmola, 2010). As a responseto the resistance, the

University introduced a Bachelors programmes on IKS and marketed IKS in different platforms (Mmola, 2010).

The case study of North West University is important to this study as it exposes the conceptions of various educational stake holders regarding IK integration in the education system. In this study, the researcher sought the views of community elders, teachers and education managers regarding the decolonisation of the Geography curriculum and the teaching of IK in the study of weather and climate in the secondary schools. Issues of challenges raised by the North West University are also of significance in this study. The challenges and the conceptions expressed in the North West University study regarding the integration of IK in the teaching of Geography, might differ from the findings of this research due to the differences in the social and political environment between Zimbabwe and South Africa.

2.14.2 Case study 2: Conceptions of teachers on Integrating IK in Canadian schools

The research in Canadian schools was carried out by Dennis in 2010. The research employed a "qualitative design using community nomination to select 59 participants" (Dennis, 2010, p. 17-18). Focus group interviews and open-ended questionnaires were used to collect data from the participants. The rationale of the study was "to address the urgent need to improve and promote indigenous education in public schools" (Dennis, 2010, p. 7).

The conceptions of the teachers were that "IK should be integrated in all subjects at every level" (Dennis, 2010, p. 29). Teachers felt that, IK was supposed to be part and parcel of teaching in the classroom. The teachers were supportive about the integration of IK in the classroom as they thought it enhances self-esteem among the local people. Teachers also integrated Aboriginal studies through the use of community elders and language used by the local people (Dennis, 2010). Indigenous teaching took place through community involvement where both parents and the students participated in local traditions (Dennis, 2010). In pursuance of integrating IK in the classroom, elders were invited to teach indigenous practices and the history of the indigenous communities (Dennis, 2010).

Dennis (2010) observes that, people who had negative conceptions on IK were a challenge to integrating IK in the classroom. The other challenge observed in the Canadian study was a lack of funding and educators who were adamant about change. The teachers also blamed the curriculum which was Eurocentric and gave less importance to indigenous values. It was further observed from the teachers that, some community members viewed IK as regressive (Dennis, 2010). As a way forward, the teachers recommended a policy review on the curriculum as well as in-service workshops on indigenous teaching (Dennis, 2010).

The case study is important for this research on its qualitative methodology which was also adopted in this study. Dennis's (2010) study used focus group interviews as a data generation method. This gave the researcher a guide on how best to formulate interview questions that were to be used in the study. Dennis's (2010) study sought the views of teachers regarding the integration of IK, an aspect which was relevant to research question 1. Further, Dennis (2010) study also relates to research question 2 that explored the nature of IK that might feature in the teaching of weather and climate in secondary schools. Lastly, the case study dealt with the challenges faced by indigenous teachers in integrating IK in the curriculum. The findings helped the researcher to validate the findings from research question 3.

It is however noted that, the research in Canada may not yield the same responses with the current research as the studies are being done in geographical locations that have different social and political backgrounds. More so, this research is specific for Geography teachers and for a specific geographical area of study. In addition, this research also solicited the conceptions of community elders regarding IK integration, an aspect that has been left out in the Dennis (2010) study.

2.14.3 Case Study 3: Integration Process in Western Canadian Schools

Graham and Ireland (2008) in their study of integrating IK in Western Canada found that, teachers suggested four crucial aspects that should be considered in the integration process (see Integration Framework, Figure 2.1). Important to the integration of IK in the school system, was the need for indigenous learning resources in the schools. The study from the Western Canadian schools recommended workshops on IK teachers so that they can be knowledgeable

about the indigenous practices of the local people (Graham & Ireland, 2008). The interviewed teachers recommended field trips to traditional and cultural sites as well as involving elders as resource persons in the classroom (Graham & Ireland, 2008). Community elders were invited to teach students their heritage and language (Graham & Ireland, 2008).

In the study of integrating IK in grade 9 Social studies in Western Canada as well, Kanu (2007) concurred with Graham and Ireland's (2008) findings and further proposed putting students' background at the center of teaching. As part of the integration process, Kanu (2007) further recommended the integration of indigenous learning resources in the curriculum and developing relevant teaching strategies. The study by Graham and Ireland (2008), was important as concepts were adapted to produce an integration framework for this study as illustrated on Figure 2.1.

2.14.4 Case study 4: Integration process at the University of KwaZulu – Natal (UKZN)

The integration of IK at UKZN aimed at meeting the University's vision (Kaya & Seleti, 2013). The integration process at UKZN as outlined by Kaya (2013, p.148) can be summarized as follows:

- consultation of stakeholders in order to identify AIKS guardians and lecturers;
- creation of a taskforce selected from different departments of the University;
- creation of an advisory team constituted from different campuses to provide expertise on AIKS integration process and
- developing information centre on AIKS resources for research and teaching.

The steps were undertaken as a way of consolidating AIKS modules that were offered across different campuses. Mubangizi and Kaya (2015) also observed that, there was a need to develop an AIKS policy document which served as a guideline on AIKS. In order to achieve the vision of UKZN, workshops on AIKS and the recruitment of AIKS staff were done (Mubangizi & Kaya, 2015).

Kaya's (2013) study correlates with Hewson (2012) who confirms that studies that were carried out in Lesotho and South Africa showed that communities wanted IK teaching methods to be practiced in the schools. Efforts by UKZN on developing AIKS since 2012 has managed to

succeeded in developing an AIKS office and taskforce on AIKS drawing staff from different campuses. Further to this, UKZN enrolled doctoral and masters' students researching in the field of AIKS. In addition, it is a requirement for every student in the province of the University to study IsiZulu in order to complete their undergraduate degree (Kaya, 2013).

The case studies discussed in the preceding section are relevant to this study. They informed the researcher on the research methodology to use and provided theoretical insights. The study generated data from the community elders and teachers who gave their views on the content and IK methods to be included during the integration process. Just as in the case of UKZN and the Canadian case studies, the participants were able to suggest measures to be put in place for the effective implementation of IK in the education system.

2.14.5 Cases of programmes integration in Zimbabwean education system

In Zimbabwe various programmes have been integrated into the curricula. Amongst the programmes integrated into the curricula are Better Environmental Science Teaching (BEST) (Chikunda, 2007). BEST was introduced in order to find ways of improving the teaching of the sciences in schools. Other programmes that were integrated into the education system were education with production, political economy, Zimbabwe Science (ZimScience) and polytechnic education (Gatawa, 1998; Zvobgo, 1997).

ZimScience was initiated in 1981 to solve the problems of a shortage of science teachers, teaching and learning materials. A science kit was given to each school by the Government (Gatawa, 1998). The implementation of the programmes faced many challenges including untrained teachers and inadequate research on the programmes (Gatawa, 1998; Zvobgo, 1997).

Education with production was integrated into the curriculum in the early 1980's. Its aim was to promote productivity in education (Mashingaidze, 1997; Nhundu & Chivore, 1993; Zvobgo, 1997). The implementation process of education with production in the schools was faced with problems such as inadequate slots on the time table and insufficient resources (Kanyongo, 2005; Mashingaidze, 1997; Mudzonga & Moyo, 1994; Zvobgo, 1997). The failure of education with production programmes has been further attributed to the failure by the curriculum officers to integrate it with academic subjects (Gatawa, 1998; Mudzonga & Moyo, 1994). Gatawa

further noted that, in Zimbabwe the introduction of HIV/AIDS and guidance and counseling programmes failed to succeed because schools could not take subjects that were not examined seriously.

The integration of different programmes in the school curriculum in Zimbabwe is not a new concept, however the current literature shows that there has been no integration of IK related to weather and climate in the Geography syllabus. The current study therefore solicited the conceptions of the community elders, teachers and education managers on integrating IK in the teaching of weather and climate in secondary schools.

2.15 Challenges of integrating IK into the school curricula

Despite the benefits that accrued in the school system through the integration of IK with Western knowledge, there are challenges that are associated with the integration and implementation process in the school curriculum. The challenges include professional, political and a lack of financial resources (Battiste & Henderson, 2002; Le Grange & Ontong, 2018; Luykx, et al., 2005; Kanu, 2005). Le Grange and Ontong (2018), in a study of integrating IK in Geography observed that, a lack of resources such as IK learning materials and the lack of training in IK by teachers was a great challenge in integrating IK in the Geography curriculum.

One of the major challenges is that of people who are resistant to curriculum changes (Battiste & Henderson, 2002; Luykx, et al., 2005). The introduction of new content and approaches in the curriculum involves extensive preparation. Further, some teachers believed that they are not qualified to teach cultural issues since they were not trained on indigenous practices (Kanu, 2005). Other teachers believed that IK was not a science hence it should not be taught in the classroom (de Beer & Whitlock, 2009; Hewson, et al., 2009; Thompson, 2004). Kanu (2005) further revealed that, educational administrators may pose some challenges to the integration of IK into the Geography lessons due to cost of implementing it in the new curriculum.

The implementation of indigenous education in schools is also hindered by the lack of political will and a heavy reliance on foreign assistance (Semali, 1999; Semali & Stambach, 1997). Scholars such as Wanich (2006, p. 32) assert that “place-based education would limit graduates

with employment opportunities outside their environment." However, Smith (2002) argues that students knowledgeable about their environment are more prepared to start their businesses. In addition, Luykx et al. (2005) noted that, the integration of IK in the school curriculum is a challenge to a class with diversified students. It is difficult for the teacher who may be lacking a wide knowledge base on indigenous practices to deal with the needs of learners from different backgrounds. It was also observed that teacher training institutions have not adequately equipped teachers with IK and culturally relevant pedagogy (Luykx et al., 2005; Semali, 1999).

In Kenya, a challenge in integrating IK into the existing curricula was a result of the affluent class who had acquired a Western education. The elites did not value their indigenous heritage due to Western values (Owuor, 2007; Semali, 1999). Further, Owuor (2007) notes that people within the same geographical area may not have the same conceptions on knowledge. This makes it difficult to decide on what should be incorporated in the new curricula. Luykx et al. (2005) cites the pressure of work in terms of preparations and a lack of administrative support as a challenge to cope with diverse student cultures and integrating IK into the education system.

A further challenge to integrating IK in the Geography curriculum is urbanisation. Padmasiri (2018) observed that, urbanisation has disintegrated families. Indigenous teaching is anchored in family ties in which family elders played a role in educating children. Urbanisation has introduced new life styles and individualism such that family elders no longer have the opportunity to instill indigenous education to the youngsters (Padmasiri, 2018). In addition, Padmasiri, blamed the introduction of technological developments such as the use of the internet and globalization as barriers to effective integration of IK in the classroom as learners now spent their time on these technologies thereby depriving elders of much needed time to impart indigenous education to the children.

The study's research question 3 deals with the challenges faced by educational stakeholders during IK integration and implementation. A brief review of the literature on challenges is important to understand and to probe further conceptions by the participants on the challenges that could be experienced in integrating IK in the teaching of the topic on weather and climate in Geography in the secondary schools.

2.16 Theoretical Framework for the study

The integration of IK is underpinned by various assumptions. These theories that form the bedrock of this study are post-colonial theory, social constructivism, multicultural theory and *ubuntu* philosophy. The characteristic features of the theories which have relevance and their value to this study are explained in this section.

2.16.1 Edward Said's Post-colonial theory

The research is underpinned by Said's (1978) post-colonial theory put forward in the book "*Orientalism"*. Said argues that, the colonisers used education to enhance their dominance over the colonised. The effect of colonial education on the local people was for the colonised to despise their own traditional practices. The theory explains how the disadvantaged and colonised people resisted the supremacy of Eurocentric forms of education (Brayboy, 2004; Kumashiro, 2001; Mohanty, 2004; Subedi &Daza, 2008; Viruru, 2005).

It is in the post-independence period where indigenous people are now in control of their socio-political environment (Hickling-Hudson, et al., 2003; Sawant, 2012). The theory is opposed to the Eurocentric view that regards indigenous people as retrogressive (Digole, 2012). It is accepted that the colonisers imposed their culture upon the local people in order to justify their dominance and supremacy over the local people. In the British colonies, Christianity was used as a tool to suppress the local people (Jaware, 2012). Contrary to the perception by the colonisers that the indigenous people were academically backward, Mapara (2009) argues that even before colonization, the local people had showed their ingenuity that competed very well with any other form of education.

The post-colonial theory is appropriate for the study as the research sought to integrate relevant IK into the study of weather and climate in Geography in secondary schools that had received very little attention from the colonial power. Said (1978) theory guided the study to establish the views from the teachers, education officers and community elders about the integration of IK in the teaching of Geography lessons in secondary schools. It also helped the study in exploring indigenous methodologies that could be integrated and used in the teaching of Geography lessons.

Post colonial theory informed the researcher on the research topic which aims at decolonising Eurocentric forms of knowledge in Geography education. Moreso, it informed the researcher on the indigenous topics that could be integrated in the Geography syllabus, for example, indigenous methods of weather forecsting. Post colonial theory further informed the researcher on the participants of the study. The theory acknowledges that data could be generated by the community elders as they are the custodians of indigenous knowledge. Community elders were therefore selected as they have the expertise to generate data (indigenous knowledge) that opposes the dominance of western knowledge.

2.16.2 Lev Vygotsky social constructivism theory

The research is further guided by Vygotsky's (1978) social constructivism theory. It is a learning theory that places emphasis on the social environment in cognitive development processes (Vygotsky, 1978). Vygotsky, was of the view that cognitive development varies over geographic space and it is dependent upon the society and culture of the community (Mcleod, 2014). According to Vygotsky (1978), a child acquires knowledge through interactions with his/her environment such as with a teacher or elder in the community. The environment wherein children grow has an influence on the cognitive development of the learner (Mcleod, 2014).

The theory is applicable to this study due to its emphasis on socio- cultural interaction. Learners interact with their human and physical environment in the acquisition of knowledge. It is the thrust of this study that the beliefs and culture of the learner should be integrated in the teaching of weather and climate in Geography in the secondary schools. This integration of the learner's background and beliefs helps the learner to comprehend new concepts taught in the classroom (Castagno & Braboy, 2008; Shizha, 2014). Vygotsky's (1978) theory supports the use of the interpretive paradigm that acknowledges that reality is socially constructed (Cohen, et al., 2011; Dina, 2012).

Inferring from the Vygotsky's (1978) theory, the study generated data from the respondents on the beliefs and cultural aspects of the community of Manicaland in order to answer research questions 1, 2 and 3 of this study. The data on beliefs and culture are important as they have a bearing on the development of the mental processes of the students. Teachers and community

elders unpacked their conceptions on how they believe IK could be integrated and taught in the Geography lessons of weather and climate. Data were also sourced from the respondents on the possible challenges that might be faced during the integration process. Integrating IK in the teaching of weather and climate in Geography is a way of decolonizing the curriculum as explained by Odora Hoppers (2005) and Shizha (2013). Further, the theory of social constructivism is important in the study as it influenced the research design and the methods of data generation. In the study, data was collected through the interaction with the environment (schools and the community). In addition, teachers and community elders were involved in generating data that could be used in the teaching of weather and climate in secondary schools.

2.16.3 Multiculturalism theory

Multiculturalism is a system of beliefs that gives importance to multicultural societies and their beliefs (Knight, 2008; Kymlick, 2012; Rosado, 1997). The theory contests the discrimination of the disadvantaged groups. It is a theory that calls for "human equality among all nations" (Kymlick, 2012, p. 6). It emanated from the need to cater for classes with diversified learners. This diversity called for teachers to review the ways of teaching in the classroom (Jay, 2011).

Multiculturalism developed as a result of colonised nations attaining their independence. They strived for fairness amongst the disadvantaged groups in the society (Jay, 2011). The proponents of multiculturalism are against the supremacy of the Eurocentric form of education. The theory is underpinned by the recognition of the different forms of knowledge (Stanley & Brickhouse, 2001). Walker (2000) notes that indigenous students performed poorly in learning institutions which do not consider the background where the learners are coming from. Individual success tends to occur in those institutions which include culture within their education system (Bat, 2011).

Multicultural theory is relevant to this study as it acknowledges and respects different beliefs, values and languages from different groups that is brought into the classroom. It is within the context of the study that indigenous practices find more space in the teaching of weather and climate in Geography in the secondary schools. The theory also guided the study on data generation instruments used that suited people with diverse backgrounds. Focus group and

individual interviews were therefore employed in the study. The theory supports soliciting conceptions from various stakeholders in pursuit of integrating IK in the classroom since it acknowledges different forms of knowledge (Knight, 2008; Kymlick, 2012) which also had resonance with this study.

2.16.4 Ubuntu/unhu Philosophy and its relevance to the study

The *ubuntu/unhu* is a viewpoint in which an individual is a person because of other community members (Mubangizi & Kaya, 2015; Odora-Hoppers, 2017). It is concerned with fairness within the society. A person is said to have *unhu* if that individual has characteristics expected from the society such as love and care for others (Lefa, 2015; Ndondo & Mhlanga, 2014). In the African sense, the success and failure of an individual is shared amongst the whole community (Ndondo & Mhlanga, 2014). An individual is not divorced from the community; as such there is "reciprocal, interdependence and mutuality among the members in the community" (Oviawe, 2016, p.3).

In Africa, reviving the *unhu* thinking helps in decolonizing the curriculum and to produce education that is relevant to the community (Oviawe, 2013). Further, this philosophy is against the current system of education that creates rivalry by putting learners into rankings. It is concerned with developing a total human being (Mutekwe, 2015; Oviawe, 2016). *Unhu* philosophy has an impact on education and on this research. Mutekwe (2015, p. 1294) is of the opinion that "Africa as a whole should produce a total person with *unhu* who is loyal, and responsible." Further, current statistics in South Africa show students who are leaving school with inadequate knowledge of their heritage (Department of Education, 2014). This calls for the integration of IK in teaching of weather and climate in Geography in the secondary schools.

Integrating IK in the Geography curriculum is a way of reclaiming IK that has been lost through Western teaching (Oviawe, 2013). The study sought to integrate IK into the Geography syllabus that is applicable in the teaching of weather and climate in Geography. This is in line with Broodryk (2006) and Letseka (2011) who opined that, the education system manifests its social values that is worthy to its society. Further, Letseka (2011) and Msila (2008) purport that, the school learning environment is a replica of the values of *unhu* being practiced or not

practiced in the school. Msila (2008) attributes the high performance by learners to *unhu* practice at any institution. In concurrence with Msila, Lefa (2015, p.11) propounded that "*unhu* can build team work in the education system that can be used to solve disciplinary issues at the school."

The *unhu* philosophy also had a bearing on the methods used in the research. The researcher had to first of all get permission from the Ministry of Education and Culture as a way of respecting the structures in the education system in line with *unhu* virtues of respect and loyalty. A permission letter was also obtained from District inspectors, Village heads, Heads of schools and the teachers in each District before contacting the research.

Unhu believes in communal proprietorship and the sharing of resources including knowledge. This influenced the researcher to use focus group discussions and interviews. These methods allowed the sharing of knowledge with the guardians of IK in a free environment characterized by mutual respect. The interviews allowed the researcher to gather and document data on the local traditions and language usage relevant in the teaching of weather and climate in Geography in secondary schools.

The theoretical frameworks discussed in this section are the backbone of the integration framework discussed in the next section. All four theories previously discussed have similarities in that, they all refute the supremacy of Eurocentric education amongst the indigenous population. The theories emphasised the vital role of local practices in the education sector. They acknowledge the multiplicity and importance of all forms of knowledge. The integration framework is therefore guided by the common attributes of the theoretical frameworks discussed above.

2.17 Integration Framework for this study

The theoretical frameworks discussed in the preceding sections form the foundation of this study. Further, the integration framework has been informed by a case study carried out by Graham and Ireland (2008) in their study of integrating IK in the Canadian schools. The adapted integration framework is presented diagrammatically (Figure 2.2) below in stages.

Step 1: This stage identifies the nature of the problem in the existing syllabus in order to explore IK which can feature in the integrated Geography syllabus. The methodology involves documentary analysis of the syllabus aims, content and assessment.

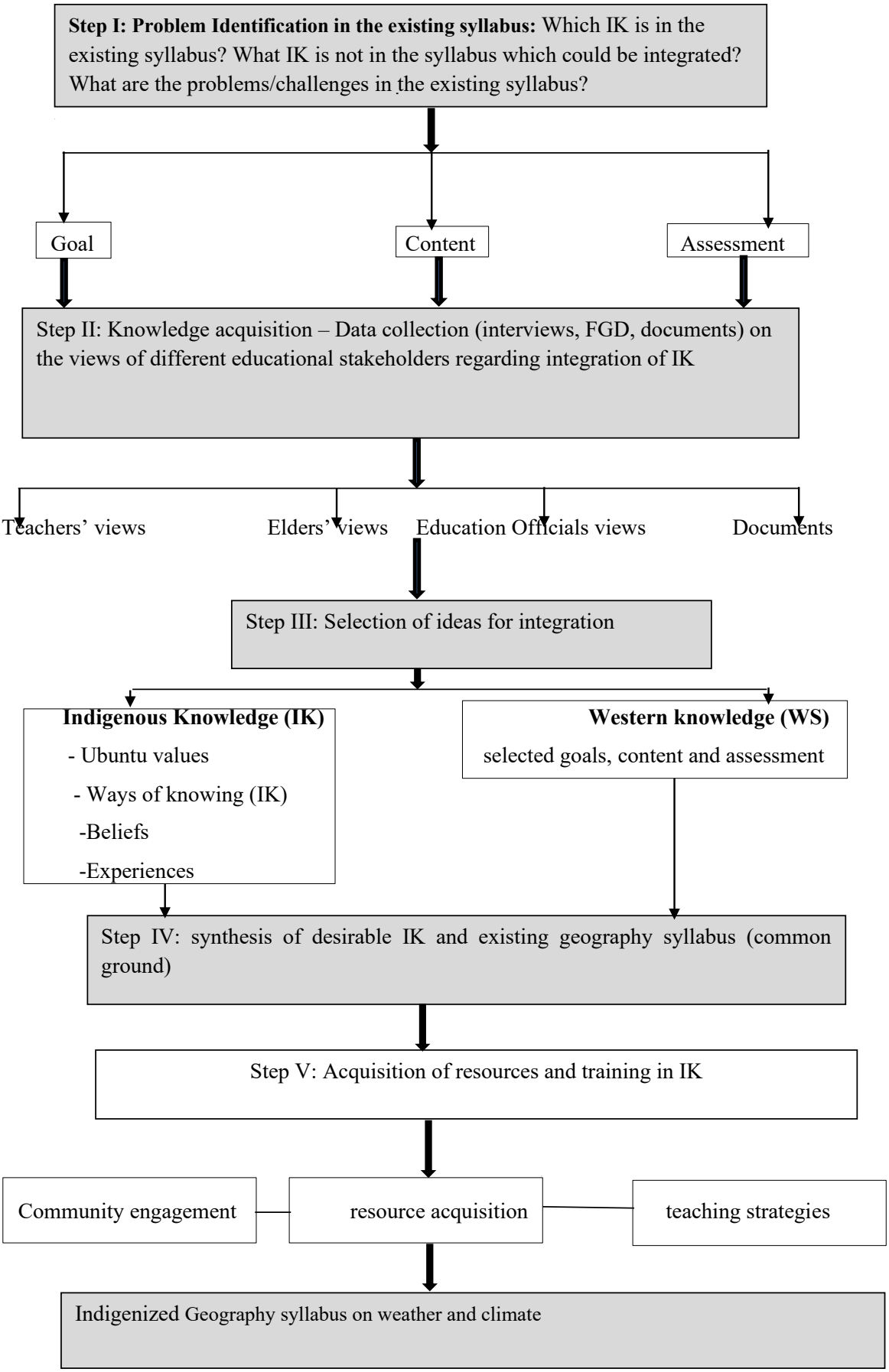

Figure 2.2: Integration Framework for the study (Adapted from Graham & Ireland, 2008)

Step 2: Interviews and Focus Group Discussions (FGD) with teachers, elders and education officials are carried out to obtain their conceptions regarding the decolonisation and integration of IK in the teaching of weather and climate in the secondary schools. This concurs with Dennis's study in 2010, in the Canadian schools, which used interviews to generate data from the elders and teachers. The stage involves generating data on participants' conceptions regarding the three (3) research objectives. Participants' conceptions regarding the decolonisation and integration of IK in the Geography syllabus (research question 1), the IK that could feature in the integrated Geography syllabus (research question 2) and the challenges (research question3) that may be encountered during the integration of IK and teaching of weather and climate are explored in step 2.

Step 3: Selection of ideas- This is part of data generation for integrating IK in the teaching of Geography. The study generated data on IK from community elders and teachers that might be integrated and feature in weather and climate lessons in Geography. In the study by Mubangizi & Kaya, (2015) at UKZN this step was referred to as developing a data base on IK.

Step 4: This is part of the integration process. According to Stephens (2000), the different forms of knowledge are synthesized at this stage in order to develop common aspects that might be integrated in the Geography curriculum.

Step 5: This would be part of recommendations from the study. It involves putting down everything that makes it possible for effective integration. This may involve designing teaching materials, the acquisition of resources and teacher training. For effective integration Hewson & Ogunniyi (2011) and Kanu (2007) recommended that learning resources and the establishment of relevant teaching strategies and assessment must be included.

Step 6: The research is complete and a report is produced with recommendations and suggestions for a culturally relevant Geography syllabus for use in the teaching of weather and climate in secondary schools.

2.18 Conclusion

Chapter 2 reviewed literature on IK and WS related to the study. It focused on the background of colonial and post-colonial education in Zimbabwe and other regions. The pitfalls of the Eurocentric teaching and the value of integrating IK into the existing Geography syllabus were analyzed. Case studies on IK integration drawn from schools and tertiary institutions were presented and discussed. The case studies showed the processes involved in integrating IK in the institutions as well as the benefits and challenges experienced. The main features of the theories forming the foundation of the study were discussed and related to the study. This culminated in the development of an integration framework that guided the study. The next chapter 3, focuses on the methodology used in the study.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

In chapter 2, significant literature related to the study and the theoretical frameworks that guided the study were discussed. The previous chapter provided literature on the concepts of IK and WS. It explored the nature of education before and after independence in Zimbabwe and other regions. Different strategies that have been used to integrate IK were also reviewed. Chapter 2 also explored the views given by different scholars regarding the integration of IK in classroom teaching. Case studies of IK integration were drawn from different areas and discussed in relation to this study. In addition, chapter 2 gave an outline of some of the challenges faced during the process of integrating IK in the study of weather and climate. The different theoretical frameworks and their relevance to the study were explained in the previous chapter.

The current, chapter 3 focuses on the research methodology of the study. The study adopted the interpretive paradigm. A qualitative research method and tools in the form of individual interviews and focus group discussions with education stakeholders and community elders which were used in the generation of data are explored. Also, the current chapter explains the research objectives and research questions used in the study. Data analysis and the trustworthiness of the data as well as the limitations of the study are discussed. The data analysis procedures and ethical issues observed during the process of data generation seals off the discussion of chapter 3.

3.2 The Research paradigm used in the study

The study positions itself within the interpretive paradigm. The interpretive paradigm can include studies referred to as naturalistic (Patton, 2015) or constructivist (Katrina & Jill, 2019). This is because interpretivist research takes place in "real-world settings and the researcher does not attempt to affect, control or manipulate what is unfolding naturally" (Patton, 2015, p. 48). In the study, the views of the participants (teachers and community elders) regarding the integration of IK in the teaching of Geography (through interviews were elicited). Interviews and focus group discussions were used to generate data and these were conducted in places

where the participants were comfortable as suggested by Patton (2015). The research paradigm understands "humans or objects in their social context" (Pham, 2018, p. 3). The paradigm is therefore relevant to the study as it seeks to explore the teachers and elders' views of teaching IK in Geography in the secondary schools in Manicaland Province.

3.2.1 Features of the interpretive paradigm

In terms of reality, the interpretive paradigm ascribes to the view that, "individuals seek understanding of the world in which they live and work" (Creswell, 2014, p. 37). In the current study, the views of individual participants were sought in order to understand their perspectives on integrating IK in the teaching of Geography. Addae and Quan- Baffour (2015, p. 24) avers that, "interpretive design accommodates multiple perspectives and versions of truths." Further, the interpretive approach suggests that, people can hold different views on the same incidence (Pham, 2018; Saunders, Lewis, & Thornhill, 2009). The paradigm therefore supports the co-existence of various forms of knowledge and the need to integrate IK and WS in the teaching of Geography.

More so, the interpretivist acknowledges that, knowledge can be determined by one's background (Mack, 2010). In addition, the knowledge arising from interpretivism is "linked to the participants and the context of the research, meaning that the products of interpretivist researcher are not universally applicable" (Katrina & Jill, 2019, p. 22). Both the researcher and the participant contribute to the generation of data (Mack, 2010). In this study, the views of the participants regarding the teaching of IK in Geography may be more applicable to Manicaland Province where the research was carried out since IK is geographically specific. However, Zimbabweans generally indulge in indigenous practices and as such, some of the findings from the research may apply to other regions.

3.2.2 Methods used in the interpretive paradigm

The interpretive paradigm employs qualitative methods and tools to study a phenomenon (Patton, 2015). It makes use of qualitative tools such as interviews and focus group discussions (Mertens, 2015). This study used these to generate information on IK that may be integrated in the teaching of Geography. Keane (2013) observed that qualitative methods were relevant in

the study of local knowledge. The assertion by Keane, has been elaborated upon by Patton (2015, p. 14) who observed that, "open ended questions and probes yield in-depth responses about people's experiences, perceptions, feelings and knowledge." The qualitative instruments used in the study (using instruments such as interviews and focus group discussions) allowed teachers and community elders to freely give their views on decolonizing and integrating IK into the teaching of weather and climate in the secondary schools.

The study also video- recorded (with permission) community elders and teachers to obtain detailed information about the indigenous practices of the people of Manicaland. This was in line with Patton (2015) who pointed out that, the interpretive paradigm makes use of detailed descriptions in the study of a particular phenomenon. Further, video recording of the interviews and focus group discussions were done to ensure that both the voices and actions of the participants were captured (Yin, 2009). In addition, Yin (2009), argues that video recording allows other researchers to follow up on what has been researched.

The interpretive paradigm is applicable to the study since IK is constructed socially as noted by Mack (2010); Pham, (2018) and Warren (1991). In this study IK and what could be incorporated was generated through interviews and focus group discussions with the teachers and community elders from different geographical locations within Manicaland Province.

3.2.3 The use of the Case Study design

A case study design was used as the qualitative strategy of generating data. A case study explores, "real people in real situations, enabling readers to understand ideas more clearly than simply by presenting them with abstract theories or principles" (Cohen, Manion, & Morrison, 2011, p. 289). It is "a study of a case in a context" (Yin, 2009, p. 18). Creswell (2013) further avers that, a case study provides details on a study of a phenomena using several sources of data. For the analysis purposes, case studies generally group the data into themes (Creswell, 2013).

Yin (2009) classified case studies into four types of which this study employed the embedded single case design. According to Yin (2009, p. 35), an embedded single case study is a "single case study with multiple units of analysis". Martin and Mirraboopa (2009, p. 212) contend that IK studies are 'multi-sited'. In the study, data was collected from multiple units of analysis namely the school system which consisted of teachers, education administrators and community elders across the whole province of Manicaland.

The "embedded single case study" (Yin, 2009, p. 35) was adopted since it allowed the researcher to generate data from several schools and communities as envisaged by (Gustafsson, 2017). The data collected from these units (schools and communities) contributed to a study of a single case which is Manicaland Province. The researcher elicited data from educational stakeholders comprising of teachers and elders through interviews and focus group discussions. This was done in order to obtain detailed narratives of the teachers and community elders regarding integrating IK into the teaching of weather and climate in Geography, in secondary schools.

Furthermore, case studies have the advantage of studying a phenomenon in "real situations, enabling readers to understand ideas more clearly" (Cohen, Manion, & Morrison, 2011, p. 289). In view of this, teachers and community elders were interviewed in their schools and communities respectively. It is noted that a case study produces a "detailed and rich story about a person, organization, event, campaign, or programme" (Patton, 2015, p. 259) which can be used by other researchers. In the study, direct quotations of the views of participants regarding integrating and the teaching of IK in Geography in the secondary schools were recorded. In this study, data from the participants were video recorded and kept in digital as well as non-digital form, so that future researchers can refer to it as suggested by Yin, (2009) and Macpherson, Brooker & Ainsworth (2000).

3.3 Use of purposive sampling in selecting the participants

Purposive sampling was used to select the participants for the study. Purposive sampling is a situation in which the researcher "hand picks the cases to be included in the sample on the basis of their judgment of their typicality or possession of the particular characteristics being sought"

(Cohen, Manion, & Morrison, 2011, p. 156). In this study, Geography teachers and community elders were selected as participants. Geography teachers were selected for their expertise in the teaching of weather and climate in the secondary schools. The elders were chosen on the basis of their expertise in IK in their communities. Cohen, Manion & Morrison (2018) supports the use of purposive sampling as this allows the selection of knowledgeable people about a phenomenon. Further, Matsika (2012) observed that, community elders were a rich source of local knowledge. Education administrators like teachers, were included in the sample as they implement and administer curriculum change. Patton (2002) and Silverman (2005) regard this selection of experts as expert sampling. The selection of people with certain experience and expertise allowed the researcher to generate large volumes of information from the selected participants as suggested by Patton (2002).

3.3.1 Sample and Sampling procedures

The sample population for the study were Geography teachers, community elders, the Geography Inspector and Curriculum Officer. Table 3.2 provides a summary of the sample that was used in the study. Seven (7) districts were selected for the study. A total of fourteen (14) schools were selected. The study further sampled fourteen (14) Geography teachers and another fourteen (14) community elders who were interviewed. A total of seven (7) FGD for teachers and seven (7) FGD for community elders were carried out in the whole Province of Manicaland. In addition, one (1) Geography Inspector and another one (1) Curriculum Officer participated in the interviews.

In order to ensure that the sample was achieved participants were informed of the pending interviews and focus group discussions so that they could reschedule their programmes. Appointments were arranged through the heads of schools and village heads who in turn coordinated with their subjects for the interviews. The school/village Head identified an alternative participant in situations where the original participant failed to avail himself/herself. Patton (2015, p. 298) regarded the process of identifying “information rich key informants or critical cases as snowballing.” Purposive sampling was done to replace the identified participant who would have failed to attend. For example, in one incident the researcher was referred to another Geography Officer by the District Inspector when the originally recommended participant became ill prior to the interview date.

3.4 Data generation instruments used

The study made use of interviews focus group discussions with the teachers, education officers and community elders as well as document analysis of the Geography syllabus in order to generate data that addresses the three research questions which are outlined in Table 3.1 and Table 3.2. The choice of the data generation instruments was informed by social constructivism (refer to section 2.16.2 for detail). The theory argues for the acquisition of knowledge through interaction with the environment (Vygotsky, 1978). The study therefore employed interactive methods (interviews and FGD) with teachers and elders to generate data.

Table 3.1: Data collection table

Critical questions	**Reason for data being collected**	**Research strategy**	**No. of sources**	**Site of data source**
1. What are the teachers and community elders' conceptions on the decolonisation of the Geography curriculum and the integration of IK in the teaching of weather and climate in secondary schools?	-To access data on teachers and community elders' views on how IK can be decolonised and integrated into the topic of weather and climate and how IK can be used in their teaching; to find out the challenges they could face and how these challenges could be overcome.	Interviews and focus groups discussions (with IK artefact introduction) are going to be used.	-Interview with two (2) Geography teachers from each of the seven (7) Districts to make a total of fourteen (14) interviews with teachers in the whole Province; -Interviews with two (2) community elders from each of the seven (7) Districts to make a total of fourteen (14) interviews with community elders in the whole Province; -Interview with one (1) Provincial Geography Inspector per whole Province; -Interview with one (1) member of the	-Manicaland schools in Zimbabwe; -Community elders in Manicaland region; -Curriculum Development section in Manicaland Province; -Manicaland Provincial Geography inspector.

			Provincial curriculum unit per whole Province; -One (1) focus group discussion consisting of four to six (4-6) teachers from each of the seven (7) Districts to make a total of seven (7) focus group discussion in the whole Province. - One (1) focus group discussion with community elders from each of the 7 Districts to make a total of seven (7) focus group discussions in the whole Province;	
2. How can IK feature in the teaching of the topic on weather and climate in the secondary schools?	-To examine IK currently featuring in the Geography syllabus; the IK that could be integrated in weather and climate and how this IK can be taught and assessed in schools. The challenges likely to be faced are	Interviews, focus group discussions and document analysis are going to be used.	-Interviews with two (2) Geography teachers from each of the seven (7) Districts to make a total of fourteen (14) interviews with Geography teachers in the Province; -Interviews with two (2) community elders from each of the seven (7) Districts to make a total of fourteen (14) interviews with	-Manicaland schools in Zimbabwe; Community elders in Manicaland region; Curriculum Development section in Manicaland Province; Provincial Geography inspector.

	explored as well.		community elders in the whole Province; -One (1) focus group discussion with Geography teachers from each of the seven (7) Districts to make a total of seven (7) focus group discussions in the whole Province; - One (1) focus group discussion with community elders from each of the seven (7) Districts to make a total of seven (7) focus group discussions in the whole Province; -Interview with one (1) Provincial Geography Inspector per whole Province; -Interview with one (1) member of Provincial curriculum unit per whole Province; -Document analysis for one (1) Geography syllabus.	

Table 3.2: Summary of the data table

Name of District	**No. of schools**	**No. of schools selected for the study**	**Number of interviews**				**No. of Focus Group Discussions (FGD)**	
			G/Trs	**C/Elders**	**P/Inspector**	**C/Unit**	**G/Trs**	**C/Elders**
Buhera	55	2	2	2	0	0	1	1
Chimanimani	24	2	2	2	0	0	1	1
Chipinge	40	2	2	2	0	0	1	1
Makoni	60	2	2	2	0	0	1	1
Mutare	67	2	2	2	0	0	1	1
Mutasa	27	2	2	2	0	0	1	1
Nyanga	25	2	2	2	0	0	1	1
Province					1	1	0	0
Total in the Whole Province	**298**	**14**	**14**	**14**	**1**	**1**	**7**	7

Key to the table:

G/Trs - Geography Teachers

C/Elders- Community Elders

P/Inspector Provincial Geography Inspector

C/Unit Member of Provincial Curriculum Development Unit

Table 3.1 shows the three researchquestions under study, the reasons for generating data for each specific research question, the instrument used to elicit data for each research question,

the participant's pseudonym, the number of participants and the site where data was collected. Different methods were used in data generation for triangulation purposes. Cohen, Manion & Morrison (2011) recommend the use of more than one source in generating data so as to improve on data trustworthiness and in this study many data sources were used.

3.4.1 Document Analysis

A document is a record of a process such as a syllabus (Cohen et al., 2011). The Geography syllabus (2015-2022) was analysed. It covers work starting from forms 1 to 4. This process entailed the analysis of the syllabus rationale, aims, objectives, assessment and content coverage on weather and climate (Appendix F).

The Geography syllabus was analysed as it helped to identify the existing knowledge in the present Geography syllabus which could be integrated with IK. It was also possible to relate the existing content of weather and climate in the Geography syllabus with the views coming from the teachers and community elders. This allowed the researcher to identify common themes which could be integrated in the teaching of weather and climate in the secondary schools. Stephens (2000) observed that common aspects from indigenous and western world views offer fertile ground for knowledge integration.

3.4.2 Individual interviews

An interview consists of oral questions by the interviewer and oral responses by the research participants (Gall, Borg & Gall, 1996). Open ended questions were employed in the study to generate data from individual interviews. Patton (2015, p.14) observed that, "open ended questions and probes yield in-depth responses about people's experiences, feelings and knowledge." The interview questions were used as a guide since some questions were asked emanating from the responses that were given during the interviews. The researcher used an interview guide to ensure that important questions that answer the research questions were asked as emphasised by Patton (2015).

Interview questions were written in English and then translated into local *Shona* language for Teachers (Appendix A), Community elders (Appendix B) and for the Provincial Geography

Inspector and Curriculum development officer (Appendix C). This was done to cater for community elders who were comfortable giving their responses in the local *Shona* language. Teachers, the Geography Inspector and Curriculum development officer all understood and spoke fluent English. They therefore predominantly gave their responses in the English. However, some of the participants switched from English to the local *Shona* language in order to explain some of the indigenous practices better. It was therefore necessary to conduct interviews in both English and *Shona* in order to cater for the participants who might chose to either use the two dominant languages used in the study area. There was no problem with responses communicated in the *Shona* dialect as the researcher understands and speaks in *Shona*. Interviews with teachers usually took on average of 30-35 minutes. Interviews were carried out from 2 February 2018 to 30 August 2018. Interviews with community elders generally took more time averaging 35-40 minutes. Community elders took more time as they took their time to explain a point as well as going through traditional protocols of greeting each other through clapping their hands. Interviews with teachers were done either in the teachers' office or in a classroom. This was to minimize interference and noise from outside. Community elders, interviews were conducted in a grass thatched hut with half- built walls (*banza* in the local language), in open space, under a tree or in a veranda away from other people to avoid disturbance and uninvited participants. Interviews were conducted in private places in line with Mitiades (2008), who suggested that interviews should be done in secluded places to avoid some disturbances.

The researcher interviewed one (1) Provincial Geography Inspector and one (1) Provincial curriculum officer. In Manicaland Province there is only one (1) Geography inspector and one (1) Provincial curriculum development officer. The Geography Inspector was selected for the reasons that the officer has expertise and administrative experience in the teaching of Geography in the Province. The Provincial curriculum unit officer is knowledgeable about curriculum issues. The officer is responsible for curriculum development and implementation in the Province.

Two (2) Geography teachers were selected for an interview from each of the seven (7) Districts to make a total of fourteen (14) Geography teachers interviewed in the province. This allowed the researcher to have in-depth interviews with the participants. Since purposive sampling

relies on identifying information rich participants, the sample provided enough depth of information to answer the research questions. Patton (2002) observed that, a small number of carefully selected cases leads to greater depth of information.

Geography teachers were selected on account of them having in-depth knowledge on the existing content in the Geography syllabus in the secondary school's sector. They are the ones who teach the topic on weather and climate. Teachers gave their views on the idea of integrating IK, the content that could be integrated and the challenges likely to be encountered. The participants also gave their views on how IK can be effectively integrated and taught in the classroom.

Two (2) community elders were selected from the surroundings of the two (2) selected schools per District under study making a total of fourteen (14) community elders who were interviewed in the whole province. Elderly people are regarded as the sources of IK on weather and climate that could be integrated and taught in Geography classes. Elderly people were selected based on their knowledge on cultural practices and methods they use to study weather, climate and seasons in their environment. This is in line with scholars (Khupe, 2014; Matsika, 2012; Mpofu, Otulaja & Mushayikwa, 2013) who viewed elderly people as custodians of local knowledge.

The interviews were video- recorded. This was done with their consent. The elderly people expressed their happiness for their culture to be recorded and documented. They felt their children are no longer aware of their culture as such documenting it was one way of ensuring that their culture lives on. Pseudonyms were used by making use of codes (see Chapter 4 for codes used). For example, for an interview carried out with a community elder in Chimanimani, the data was coded as follows: CICHIM1 (C-represented Community; I-Interview; CHIM-Chimanimani District; 1- Participant number. The codes used in the study are given in detail in chapter 4. The use of codes helped to link the source of data with the District and the participant who gave that information. At the same time this concealed the identity of the participant thereby maintaining the confidentiality of the participants.

Interviews were chosen for data in the study for several advantageous reasons. Individual interviews unveiled the views and indigenous practices of the people of Manicaland province. Individual interviews gave the researcher an opportunity to further probe the responses given by the participants in order to have a better understanding of the indigenous practices of the local people of Manicaland. Cohen, Manion and Morrison (2011) supports the use of individual interviews in that, they expose the feelings of the participants about a phenomenon under study. Further, interviews made it possible to clarify some issues raised by each participant through follow up questions. In cases where the point raised was not clear to the researcher, the participant was requested to go over it again.

Further, the use of individual interviews allowed the researcher to capture body language as noted by Remler and Van Ryzin (2015). The researcher was able to observe the use of the participant's body language as they demonstrated weather phenomena such as the movement of air masses and rainfall patterns. Interviews also allowed the researcher to be at the site where data was collected. This was important as this enabled the researcher to observe and experience the participant's cultural practices. As an example, in Honde valley the elders were able to show the researcher the hut *(banza)* where they would sit in and teach their children IK traditions. In some communities, community elders were able to show the researcher some plant species they use for weather forecasting. Interview questions allowed flexibility as Cohen et al. (2011) points out. It allowed the researcher to probe on an emerging issue as supported by Patton (2015). In some instances, the participants gave responses which were additional yet relevant to the study. It worked to the researcher's advantage as this was used to further explore the unexpected answer.

3.4.3 Focus group discussions

Patton (2015, p.475) describes a focus group as "an interview with a small group of people." The method consists of a group of participants "usually four to eight" participants (Fraenkel, Wallen & Hyun, 2015, p. 454). According to Remler and Van Ryzin, (2015) at least 2-3 different focus groups are good enough to produce credible findings. The study employed focus groups ranging from 4 to 6 participants. The small group was easy to manage and allowed the discussion to remain focused on the research questions. This was in line with Vandeleur (2010,

p.103) in the study of indigenous technology in C2005 in South Africa who observed that, "focus groups with 4 to 6 participants generated meaningful discussions."

A list of questions designed in both English and the local language, *Shona* were used to initiate discussion within the focus groups. The questions were just a guide as in some situations follow up questions were asked from some responses for either clarity or further explanations. Patton (2015, p.439) supported the use of a guide in conducting focus group discussions, "for it keeps the interactions focused while allowing individual perspectives and experiences to emerge." Teachers understood and spoke English fluently. They therefore gave their responses in English. However, some of the participants switched from English to the local *Shona* language in order to better explain some of the indigenous practices. It was therefore necessary to have interview questions in both English and *Shona* in order to cater for the participants who might either choose to discuss in either of the two languages dominantly used in the study area (Appendix D). The community elders preferred to discuss in the local *Shona* language. Questions phrased in *Shona* were therefore used in the focus group discussions with the elders (Appendix E). The preference for using local language by the participants is concurred by Khupe (2014, p. 91) in her study in Mqatsheni; she allowed participants to use their preferred language and observed that, "both their spoken and written Zulu was rich in metaphor which expressed meaning that was deeper than when they said the same thing in English." Further, Kaya and Lyana (2014) aver that, the use of local language by participants allowed them to freely express their views.

In order to have effective focus group discussions, at the beginning of each focus group, ground rules were initially set out as Kelly (2006) pointed out. The participants were reminded of the need to respect other people's views. This was to avoid cases where members can use the focus group to settle personal issues. Remler and Van Ryzin, (2015) observed that, prior issues such as disagreements in the past can distort discussions in a focus group.

Questions were also directed at reserved members of the focus group so that they can participate as well. This was to avoid a situation where some members would dominate the discussion. To reduce the geographical distance travelled by members to the venues the District

inspectors for the schools helped in identifying schools with Geography teachers that had adequate numbers to constitute a focus group. A personal car was used to transport the community elders to the venue of the focus group discussions. Members were also advised in advance of the date and time of the focus group discussions so that the participants would plan their activities or reschedule their programmes as noted by Mertens (2015). School and village heads were very cooperative in the scheduling of the focus group discussions. Consent and confidentiality issues were agreed upon before the start of any of the focus group discussion.

One (1) focus group discussion with Geography teachers in each of the seven (7) Districts making a total of seven (7) focus group discussions for teachers held in the province. Each focus group discussion consisted of 4-6 teachers. In addition, one (1) focus group discussion per District was held consisting of 4-6 community elders from the surrounding schools under study in each of the seven (7) Districts, making a total of 7 focus group discussions with community elders was facilitated in the whole province.

FGD had several advantages as a data generation strategy in the study. Much data was generated from the focus group discussions within a short period of time. Houser (2015, p. 95) noted that, “a focus group may function as a way to save time.” Further, the teachers in particular, had different backgrounds as they come from different regions and as such, they provided the researcher with different experiences on their culture and how this can be used to teach weather and climate in Geography in the secondary schools. Patton (2002) observed that, focus groups were important as they provide different perspectives and increase the trustworthiness of data.

In addition, as one member explained his/her experiences, in that it triggered other participants’ contributions. It was realized that participants made valuable contributions which extended the discussions. More-so, Remler and Van Ryzin (2015) allude that more data is generated by participants who add more contributions after listening to the arguments from other group members. As interviews were carried out, some participants showed signs of approval of the idea by nodding their heads or shaking them from side to side on disapproval. This helped the researcher to validate the ideas contributed. The other participants in the focus group were

quick to intervene where wrong information was contributed by another focus group member. Krueger and Casey (2000) concurred by noting that, the participants can either approve or disapprove the responses given by other participants thereby ensuring the correctness of the information provided during the discussion. Further to that, the use of a focus group as alluded by Punch and Oancea (2014) was cost effective to the researcher since personal resources were used to carry out the research. It was possible to interview many people in about 45 minutes to one hour.

3.4.4 Video and Audio recording

The study made use of video recording to record data from both interviews and focus group discussions. An assistant was hired to do the recordings while the researcher asked some questions and recorded some main points in the field journal. Video recording allowed the researcher to concentrate on listening to the participants' responses, taking brief notes and asking them some questions as suggested by Fisher (2010). In 2006, Kelly noted that audio recording allows one to keep a record of the interview proceedings. Videotaping enabled the researcher to record detailed information as suggested by Cohen, et al. (2011).

Permission was sought from the teachers and community elders to video record them. Consent forms were signed by the participants after they agreed to be video- recorded. The participants were assured that the information was going to be kept confidential. The researcher explained the purpose of the study and the reason for recording in an effort to establish good rapport with the participants. The participants were also assured of confidentiality and privacy regarding the recording and storage of the recorded material.

3.5 Gaining access to the participants in the study

In order to access the participants, it is important as pointed out by Mertens (2015) to establish a good rapport with the participants. The researcher was guided by *ubuntu values* of respect for elders to gain access to the participants. As someone who grew up in the community of Manicaland, the researcher knew some of the cultures expected in the community such as clapping hands after greeting as a sign of showing respect to the participants. This made access to the community easier for interviews and focus group discussions. Furthermore, permission

letters from the Ministry of Education and Culture (Appendix L and Appendix M) were used to access participants in Manicaland secondary schools before interviews or focus group discussions were conducted. In addition, permission was granted by the District education inspectors to access schools in their respective Districts (Appendix M) through stamping the letter which was acquired from the Head office as a sign of approval. On arrival at every school recommended by the District inspector, the researcher first of all reported to the Head of the school to seek permission and make appointments to meet the sampled teachers. The Head of the school or Deputy Head in most cases, called the department head to schedule an appointment with the teachers for the researcher.

Permission from the Ministry of Rural Development, Promotion and Preservation of National Culture and Heritage (Appendix N) was sought in order to get access to the community elders. The village heads who knew elders knowledgeable in IK, helped the researcher to coordinate and invite the selected community elders to the venue for the interviews. The procedure followed in getting permission is in line with Silverman (2011) and Creswell (2014) who suggested that getting permission from gate keepers is important in accessing the study participants.

In order to establish a good rapport with the research participants, the purpose of the study was explained first. The participants were encouraged to express their views freely since the discussion was going to be kept confidential. To overcome the issue of tight schedules by teachers and community elders, an appointment was made to hold the interview with the participants at a time when they were free to hold the interviews. This was done in advance so that the participants would adjust their work schedules.

3.6 Recruitment Strategy for the Participants

This section focuses on the procedures that were followed to select the participants for the interviews and focus group discussions in order to address the research questions. The participants in this study are Geography teachers, Community elders, the Geography Inspector and Officer from the Curriculum unit in the Manicaland Province.

3.6.1 Strategy used to recruit Teachers

In order to negotiate access to the teachers, permission was sought from the gatekeepers. Creswell (2014, p. 237), observed that, "it is important to gain access to research or archival sites by seeking approval to gatekeepers." In order to access secondary schools in Manicaland, permission was obtained from the Head office of the Ministry of Primary and Secondary Education in Harare (Appendix L). All primary and secondary schools fall under this Ministry. From the Ministry head office, the next point of call was the Provincial education offices in Manicaland. The Provincial Education Director (PED) who is responsible for all schools in Manicaland then authorized the researcher to access schools in the seven Districts of Manicaland (Appendix M).

The Provincial Education Director signed and date stamped the letter for attention by District Inspectors (Appendix M). The researcher then sought the approval of the District Staff Inspectors (DSI), responsible for schools in each of the District. The DSI would then sign the same letter for attention by the schools. The District Education Inspector was the one who assisted me in choosing the schools after explaining to him the aim of the study. From the District office, the researcher proceeded to each of the schools.

My first port of call at the school was the school head from whom permission to either interview or hold focus group discussions with teachers was sought. The Head or Deputy of each school the researcher was directed to by the DSI then assisted me, the researcher in identifying the Geography teachers at the school. The Head or Deputy called in the Geography head of department to organize the teachers for interviews or focus group discussions.

3.6.2 How the schools were selected for the study

Convenience sampling was used to select the schools. Etikan, Musa & Alkassim (2016, p. 2), are of the view that, "the main objective of convenience sampling is to collect information from participants who are easily accessible." Since personal resources were used, those schools that were easily accessible by road and within reasonable distance from the researcher's residence were selected to reduce on transport costs. Schools that had adequate numbers of Geography teachers to constitute a focus group discussion were also preferred for the study. The DSI

assisted in identifying the schools. The schools were selected on the basis of their accessibility, cost and availability of Geography teachers, a view shared by Houser (2015). Once the school had been chosen, purposive sampling was used to select the Geography teachers who would participate in either the interviews or focus group discussions. Purposive sampling was chosen because the researcher wanted to collect data from the Geography teachers who either teach or have taught weather and climate. Purposive sampling was employed to select the participants in order to access "knowledgeable people who have in-depth knowledge," (Cohen, Manion & Morrison, 2018, p. 45) about integrating IK in the teaching of Geography in secondary schools. If the chosen school did not have adequate number of Geography teachers for the focus group discussion and interviews, teachers from the nearest school were purposively selected in order to have adequate sample for the study. Community elders were recommended by villagers who knew people knowledgeable in IK in their area of jurisdiction. Selected elders would also recommend other experts in indigenous knowledge. Elders were selected on the basis that they are the custodians of indigenous knowledge. Teachers on the other hand were nominated by school heads of the selected schools on the basis of their knowledge in Geography.

Once permission was granted the participants' consent and an appointment were sought prior to the interviews and focus group discussions. Making appointments with the participants ensured a high attendance for the interviews. The teachers were able to reschedule their work plans in advance in order to participate in the study.

3.6.3 Strategy used to recruit Community elders

In order to access community elders, certain procedures were followed. The Provincial Administrator for Manicaland who is in charge of the Ministry of Rural Development, Promotion and Preservation of Natural Culture and Heritage (Appendix N) was approached. The Ministry is in charge of all the Village heads in the Province of Manicaland where the research was carried out. The Provincial Administrator gave the researcher an approval letter to carry out the research in the province.

A village head in each of the seven Districts of the province was purposively selected. The village head was nominated on the recommendations of the District Administrator and other

elders in the community based on their expertise on IK issues. A letter from the Provincial Administrator that granted the researcher permission to conduct the study was then presented to each of the selected village heads in each District. This was followed by introductions and explanation of the purpose of the visit to each of the selected village heads in each of the seven Districts of Manicaland. The Village heads were approached because they were the ones who could help the researcher to, as proposed by Mpofu et. al. (2014), identify community elders who had the wisdom, knowledge and experience in the culture and tradition of the indigenous people. The elderly people were chosen as they are the upholders of local knowledge (Matsika, 2012) and they can explain to the researcher their past experiences relating to the study's research questions. The Village head nominated elders in their community who would participate in the interviews and focus group discussions.

Khupe (2014) found such a process of selecting elders through recommendations by others to be useful in a study of IK carried out in Mqatsheni, South Africa. If the number of participants was not enough the originally selected community elders recommended other elders in the community until the required number of participants was attained. Patton (2002) calls such a strategy of choosing participants, snowballing. The process assisted the researcher to identify participants for both the interview and focus group discussions in each of the seven Districts of Manicaland. It enabled the researcher to come up with an adequate number of participants who were knowledgeable about the culture and tradition of local communities.

3.6.4 Strategy for recruiting Geography Inspector and Curriculum Officer

An appointment with each of the officers for an interview was sought upon the researcher introducing himself and explaining the purpose of the visit. This was followed by the presentation of the letter from the Ministry of Primary and Secondary Education (Appendix L) which granted the researcher permission to carry out the study in the province. Aspects of consent and confidentiality were discussed prior to the interviews. There was only one Geography inspector and one curriculum officer in the province hence there was no choice on the selection of these participants. Purposive sampling was used to select the Geography inspector and the curriculum officer. The Geography inspector was chosen for his expertise and experience in the teaching and quality control of Geography in secondary schools. The

curriculum officer was chosen on the basis that he was in charge of curriculum issues in the schools.

3.7 Pilot Study of instruments used in my study

A pilot study is a trial run conducted in preparation of a full-scale research (Teijlingen & Hundley, 2001). In this research pilot studies of interview and focus group discussion questions were carried out with colleagues who are Geography teachers in order to ensure validity and reliability of the instruments as suggested by Van Wijk and Harrison (2013).

In the first instance interview and focus group questions were asked to two of the Geography teachers whom the researcher works with in the same department. It was realized from their comments that some of the proposed questions were repetitive in one way or the other. These repetitive questions were removed from the sample questions. Secondly, some questions which were not clear were rephrased. Cohen et al. (2011) support the idea of piloting research instruments in order to restructure those that are not clear and those that do not answer the research questions.

The purpose of carrying out a pilot study was to ensure that the questions asked were answering research questions, a view supported by Dikko (2016). Questions which were of no use were therefore eliminated. Some questions were also added after a discussion with colleagues. This was done to ensure that all research questions were being answered by the questions, a view pointed out by Berg (2001).

Community elders were asked their own set of questions written in the local dialect. Two (2) community elders were asked interview and focus group discussion questions. Ambiguous questions were modified after realizing that they were not clear. Some uncommon words were also replaced. This was in conformity with Rudestam and Newton, (2015) who indicate that confusing and unclear questions are supposed to be checked on during the piloting process.

3.8 Data Analysis in my study

Remler and Van Ryzin (2015, p.77) point out that, "qualitative data analysis is the organization and interpretation of field notes, interviews and recordings". The method involves assemblage, coding and establishing themes (Creswell, 2014; De Wever, Schellens, Valke, & Van keer, 2006; Hsieh & Shannon, 2005; Mayring, 2000; Schillings, 2006). The method unearths themes and patterns and it explores the implications of the messages (Creswell, 2014; Patton, 2002). The advantage of grouped data is that, it enables themes, patterns and similarities to be established (Cohen, et al., 2011).

3.8.1 Steps undertaken in analyzing data

The following steps as guided by Creswell (2014) were followed in analyzing the data.

Step 1: The first step was to transcribe all the interviews and focus group discussions. This entailed replaying the video recordings. In the field some field notes were written which complemented the video recordings. Data from the community elders which was recorded in the local language was first translated into the English version.

Step 2: Organizing data: At this stage data was placed into files. Interview and focus group data from teachers were placed in one folder and labeled. A folder for community elders' interviews and focus groups were also placed in a different folder and labeled. Data from the document analysis of the Geography syllabus was placed in its own folder.

Step 3: Reading transcriptions and field notes. Field notes and transcriptions were read through and brief notes were scribbled at the margins of my transcriptions. Different highlighters were used to mark data that answered my research questions.

Step 4: Grouping data: At this stage data was grouped according to the research questions: The research questions were rephrased as follows:

1. Views of teachers and community elders on decolonisation and integration of IK in the Geography curriculum in the secondary schools (research question 1)

2. How IK can feature in the teaching of weather and climate in Geography in the secondary schools (research question 2)

3. Challenges of integrating IK in teaching weather and climate in Geography in the secondary schools (research question 3)

Data that answered research question 1 was highlighted (one) with green highlighter and data that answered research question 2 with yellow highlighter. Data that answered research questions 3 was highlighted with orange colour. This was done in line with Fisher (2010) who recommended the use of a highlighter pen or noting points at the margin of a sheet to identify themes. Data was therefore assigned to a specific colour, a process called coding. Coding according to Remler and Van Ryzin (2015) involves placing data into groups. The rephrased research questions became the broad themes. Creswell (2014) observed that once the data has been coded it can now be developed into themes.

Step 5: Presenting the data: Data was presented under each theme as guided by my research questions. Data was presented in form of thick descriptions and tables as emphasised by Creswell (2014). The next step was to analyze data for each of the research question as recommended by Cohen et al. (2011). The use of video/audio tape recordings allowed the researcher to capture detailed accounts of the participants.

3.9 Data Trustworthiness (Validity, Reliability and Rigour)

In this section measures undertaken in the study in order to ensure that the data collected achieved its intended purpose are presented. This was done to make sure the data collected is useful, dependable and worthwhile. The issue of validity is discussed first followed by reliability and rigour.

Scholars (Cohen et al., 2011; Creswell, 2014; Lincoln & Guba, 1985; Onwuegbuzie & leech, 2006) discussed various measures to achieve validity in a research. These include use of triangulation, multiple sources, debriefing, member checking, rich descriptions, external audit, prolonged engagement and structural relationships. Triangulation involved using more than one source of data to explore the same aspect (Cohen et al., 2011; Creswell, 2014). It is used to assess data coming from different instruments in order to verify facts (Hoffman, 2007; Gall, Borg, & Gall, 1996). In the study, information from interviews and focus groups were analyzed to check on discrepancies and similarities. In the research individual interview data was

checked against data from focus group discussion as a way of triangulation. Denzin (1970), refers the use of different instruments to study the same aspect as methodological triangulation.

Peer review was also used to check the worthiness of the data collected. Creswell (2014) and Lincoln and Guba (1985) earlier found that, a review of the findings by another person can be used to test trustworthiness of the data generated. The researcher gave an opportunity to peers at work place to ask questions on the methods I used to generate data and the research findings. Further, the major findings were availed to the participants (member checking) to check whether they represented their views and interpretations as recommended by several scholars (Creswell, 2014; Lincoln & Guba, 1985 and Onwuegbuzie & Leech, 2006).

In addition, the researcher presented thick descriptions using direct quotations of the participants' responses as a way of ensuring the trustworthiness of the findings as eluded by Cohen et al. (2011). The use of thick descriptions has been hailed by Creswell (2014, p. 251), who noted that, "when qualitative researchers provide detailed descriptions of the setting, the results become more realistic and richer." Further, in order to achieve data trustworthiness, the researcher collected data over a long period of time (prolonged engagement). Data was collected from the field from 2 February to 30 August 2018. Seven (7) focus groups and fourteen (14) interviews with teachers were carried out. Further to these seven (7) focus group discussions and fourteen (14) interviews were done with Community elders. Two (2) interviews were carried out with Educational Administrators. The sample was therefore adequate to produce valid findings. Creswell (2014, p. 252), acknowledges that, "the researcher develops an in-depth understanding of the phenomena under study," by spending more time in the field. The research was carried out from 2 February to 30 August 2018. The long period spent in the field collecting data from the participants, allowed the researcher to generate sufficient data to support the research findings.

The researcher further kept documents and transcripts used in the research (audit trail) as recommended by Onwuegbuzie and Leech (2006). This helped the researcher to go back to the records and documents whenever there is need for verification.

Various steps were also undertaken to ensure that data collected was reliable. Reliability refers to, "dependability, consistency and replicability over time, over instruments and over groups of respondents" (Cohen et al. 2011, p. 199). A pilot study of the instruments was used in order to assess their dependability. During the pilot study of the instruments, some questions were asked to the participants in order to check on their clarity and consistency. Simple and straight forward questions were asked to avoid ambiguity. Questions which were not clear enough were rephrased before the actual data collection, a view supported by Cohen et al., (2011).

Open ended questions have been selected for use in the research as this ensured that the informants can elabourate and express their views freely (Bless & Hugson – Smith, 1995; Denzin & Lincoln, 2000; Hoffmann, 2007; Mertens, 2015). In support of using open ended questions, Mertens (2015, p. 384) observed that, "open ended questions allow the respondent's concerns and interests to surface." Further, open interviews were useful in the study as they helped to clarify issues through further probing (Bless and Higson-Smith, 1995; Cohen, Manion & Morrison, 2011; Patton, 2015). During focus group discussions, the researcher also clarified some aspects of the questions which were not clear to the respondents as argued by Stewart & Shamdasani, (1990).

3.10 Ethical Issues

Informed consent has been explained by Punch and Oancea (2014, p. 65), as a situation in which, "participants agree freely to be part of research, that they understand what their participation entails and how it will be reported and that they feel free to withdraw their agreement at any time." These procedures were explained to the participants before the individual interviews and focus group discussions were undertaken.

Before carrying out field research, the researcher had to fulfill the requirements of UKZN ethics committee and was granted full ethical clearance protocol reference HSS/1063/017D. Cohen, et al, (2011) stressed the importance of informed consent and confidentiality as key issues to consider on ethics in the research. The procedures that guided the study to ensure the participant's rights were protected were largely guided by Cohen, et al, (2011) and Creswell (2014). Informed consent forms for interviews were read and signed by Teachers, Geography inspector and Curriculum development officer (Appendix G) and Community elders

(Appendix H). A separate letter of consent for the focus group discussions were also read and signed by the Teachers (Appendix I) and Community elders (Appendix J) before any interview or focus group discussion were held. The informed consent forms were written in English as well as in the local language, *Shona*. The participants were given an option to read and sign the letter of consent in their preferred language which they understand better. This ensured the participants sign the letter of consent whose contents they understood well. The informed consent form explained the nature and purpose of the research. Before the interviews, focus group discussion and tape recording begin the participants were requested to sign a declaration form after understanding the contents and purpose of the research. The participants involved in this research were mature and capable of making decisions as recommended by Cohen, et al, (2011).

The researcher was cognizant of the view by Keane (2008, p. 1) who advises that, "ethical obligations cannot be sufficiently met through conventional contractual agreements." The researcher in addition to written permission, requested for oral permission. This was very important for community elders who may not be in a position to understand the contents of the consent forms. The participants were informed in time of their involvement in the research so that they could make a decision to participate or not.

To protect the privacy of the participants, the information collected was kept confidential. Participants' identity was hidden through the use of coding system. This was in line with Tarisayi (2017) study on land reform in Zimbabwe that used codes to identify participants and to hide their identity. The information collected from individual interviews, focus group discussions and tape recordings was kept confidential as pointed out by Cohen et al., (2011). Information collected can be made accessible to the public without revealing the source of the information (Cohen et al, 2011).

On the use of audio video equipment, the researcher asked permission in writing and verbally before the start of the recording of interviews and focus group discussions as recommended by Creswell (2014). The participants were asked to sign consent forms or accept verbally before the recording resumed. The participants were re- assured that if at any point they are no longer comfortable with the recording, the equipment can be switched off as suggested by Fisher

(2010). Only one teachers' focus group refused to be video recorded. Instead they preferred to be voice recorded.

3.11 Data storage and disposal

Data has been stored in digital and non-digital format. Microsoft word was used to store documents and texts. The digital nature of data allowed production of numerous copies to be stored in different computers. The data was stored in different computers in my email as backup. Data was also stored on the external hard drive. The researcher ensured there was an antivirus software on the computer to avoid loss of data from a virus attack.

In order to manage the data, files are created to ensure easy access to the data whenever it is required. File names that are concise and meaningful including dates, month and year have been used for easy access to them whenever required. It was essential to keep recordings and transcripts used in the interviews and focus group discussions in order to keep record of what transpired during the study (data trail).

3.12 Limitations of the Study

The study is based on one Province out of the ten (10) Provinces in Zimbabwe. The results from the small study area may not be generalized to other regions more so since IK is locally based. The study also focused on weather and climate in Geography in the secondary schools. The results may not apply to other Geography topics. However, narrowing the study to a small area allowed an in-depth study of the area under study.

3.13 Conclusion

The chapter explained the methodology used in the study. The research design and data generation methods used in the study were explored. The population sample and sampling technique employed in the study were elaborated. The research questions and methods to collect data were discussed. The use of interviews and focus group discussions were explained in detail, justifying their use in the study. The procedures used to select the participants in the research were justified in the discussion. In this chapter the measures that were put in place to ensure the worthiness and dependability of the data were elucidated. Finally, the chapter

explained how data was analyzed. Finally, the issues of data storage and ethical issues in the study were elaborated upon. In the next chapter 4, the findings from the research are presented. The presentations of the findings are guided by the three research questions.

CHAPTER 4: RESEARCH FINDINGS

4.1. Introduction

In chapter 3, the research methodology and ethical issues were explained. This chapter focuses on the presentation of the findings based on the three research questions which are outlined below:

1. What are the teachers and community elders' conceptions on the decolonisation of the Geography curriculum and the integration of IK in the teaching of weather and climate in secondary schools?
2. How can indigenous knowledge feature in the teaching of the topic on weather and climate in Geography in secondary schools?
3. What could be the possible challenges of integrating indigenous knowledge in the teaching of weather and climate in Geography in the secondary schools?

Chapter 4 is structured into four parts as illustrated in Figure 4.1

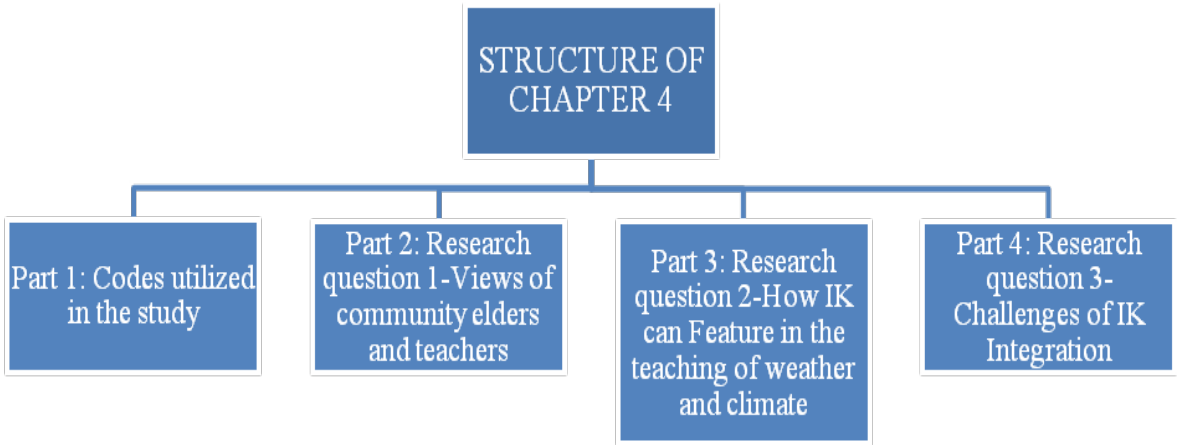

Figure 4.1: Structure of chapter 4

Part 1 focuses on the codes used to identify participants in the study. Part 2 answers research question one (1), which presents the views of community elders and teachers on the decolonisation and integration of IK in the teaching of weather and climate in the secondary schools. Part 3 addresses research question 2 on how IK can feature in the teaching of weather and climate in the secondary schools. Finally, part 4 is a response to research question 3 which explores the challenges of integrating IK in the teaching of weather and climate.

4.2. Part 1: codes used in the study

Part 1 is an explanation of the sample utilized in the study. It explains the codes used to identify participants as well as the gender of the participants and other relevant information about the sample.

4.2.1 Codes used in the study

The codes used were for the purpose of identifying participants in the research and for ethical reasons. This was done so as to ensure the anonymity and confidentiality of the participants in the study. The codes used were to identify the individual who made the contribution, the instrument used to collect the data as well as the District where the contribution was made. In table 4.1 for example, TIBUH1 means Teacher (T) Interview (I) in Buhera (BUH) District participant number one (1). The first individual to make a contribution in an interview or focus group discussion was participant 1 and the second person who made a contribution was participant 2 and so on. The coding system I used was important, in that data can be traced to the participant who made the contribution for reasons of trustworthiness of the data as well. Similar coding that traces data to the source was found useful by Tarisayi (2017) in a study of land reform beneficiaries in Zimbabwe and Mashoko (2018) in his study on food preservation in Science teaching. Table 4.1 shows the codes utilized for teachers and education personnel.

Table 4.1: Codes used for Teachers and Educational Administrators interview

Code used	Meaning
TIBUH1	Teacher interview in Buhera District participant 1
TIBUH2	Teacher interview in Buhera District participant 2
TICHIM1	Teacher interview in Chimanimani District participant 1
TICHIM 2	Teacher interview in Chimanimani District participant 2
TICHIP1	Teacher interview in Chipinge District participant 1

TICHIP2	Teacher interview in Chipinge District participant 2
TIMAK1	Teacher interview in Makoni District participant 1
TIMAK2	Teacher interview in Makoni District participant 2
TIMUT1	Teacher interview in Mutare District participant 1
TIMUT2	Teacher interview in Mutare District participant 2
TIMUTA1	Teacher interview in Mutasa District participant 1
TIMUTA2	Teacher interview in Mutasa District participant 2
TINYA1	Teacher interview in Nyanga District participant 1
TINYA2	Teacher interview in Nyanga District participant 2
MPGI	Manicaland Province Geography Inspector
MPCDO	Manicaland Province Curriculum Development Officer

MPGI was a code used for interviews carried out with the Manicaland Province Geography Inspector. There is only one Provincial Geography Inspector as such there was no room for selection. The Inspector was a suitable person to conduct interviews with since the Inspector manages and monitors the teaching of Geography in the province. Similarly, MPCDO represents interviews conducted with Manicaland Province Curriculum Development Officer. The MPCDO is responsible for curriculum development and implementation hence the choice to select this participant for the interviews.

Table 4.2: Codes used for interviews with Community elders

Code used	Meaning
CIBUH1	Community elder interview in Buhera District participant 1
CBUH2	Community elder interview in Buhera District participant 2
CICHIM1	Community elder interview in Chimanimani District participant 1
CICHIM 2	Community elder interview in Chimanimani District participant 2
CICHIP1	Community elder interview in Chipinge District participant 1
CICHIP2	Community elder interview in Chipinge District participant 2
CIMAK1	Community elder interview in Makoni District participant 1
CIMAK2	Community elder interview in Makoni District participant 2
CIMUT1	Community elder interview in Mutare District participant 1
CIMUT2	Community elder interview in Mutare District participant 2
CIMUTA1	Community elder interview in Mutasa District participant 1
CIMUTA2	Community elder interview in Mutasa District participant 2
CINYA1	Community elder interview in Nyanga District participant 1
CINYA2	Community elder interview in Nyanga District participant 2

Table 4.2 shows the codes used in the interviews with the community elders. In table 4.2 for example, CIBUH1 means Community Elder Interview (CI) in Buhera (BUH) District,

participant number one (1). The alphabet (C) refers to community elder; BUH represent Buhera District, where the interview was carried out. The last number (1) shows the participant number in order of their contribution

Table 4.3: Codes used for Teachers' Focus group discussions

Code used	**Meaning**
TFGBUH1	Teachers focus group discussion in Buhera District participant 1
TFGBUH2	Teachers focus group discussion in Buhera District participant 2
TFGBUH3	Teachers focus group discussion in Buhera District participant 3
TFGBUH4	Teachers focus group discussion in Buhera District participant 4
TFGBUH5	Teachers focus group discussion in Buhera District participant 5
TFGCHIM1	Teachers focus group discussion in Chimanimani District participant 1
TFGCHIM2	Teachers focus group discussion in Chimanimani District participant 2
TFGCHIM3	Teachers focus group discussion in Chimanimani District participant 3
TFGCHIM4	Teachers focus group discussion in Chimanimani District participant 4
TFGCHIM5	Teachers focus group discussion in Chimanimani District participant 5
TFGCHIP1	Teachers focus group discussion in Chipinge District participant 1
TFGCHIP2	Teachers focus group discussion in Chipinge District participant 2
TFGCHIP3	Teachers focus group discussion in Chipinge District participant 3

TFGCHIP4	Teachers focus group discussion in Chipinge District participant 4
TFGCHIP5	Teachers focus group discussion in Chipinge District participant 5
TFGCHIP6	Teachers focus group discussion in Chipinge District participant 6
TFGMAK1	Teachers focus group discussion in Makoni District participant 1
TFGMAK2	Teachers focus group discussion in Makoni District participant 2
TFGMAK3	Teachers focus group discussion in Makoni District participant 3
TFGMAK4	Teachers focus group discussion in Makoni District participant 4
TFGMAK5	Teachers focus group discussion in Makoni District participant 5
TFGMUT1	Teachers focus group discussion in Mutare District participant 1
TFGMUT2	Teachers focus group discussion in Mutare District participant 2
TFGMUT3	Teachers focus group discussion in Mutare District participant 3
TFGMUT4	Teachers focus group discussion in Mutare District participant 4
TFGMUT5	Teachers focus group discussion in Mutare District participant 5
TFGMUTA1	Teachers focus group discussion in Mutasa District participant 1
TFGMUTA2	Teachers focus group discussion in Mutasa District participant 2
TFGMUTA3	Teachers focus group discussion in Mutasa District participant 3

TFGMUTA4	Teachers focus group discussion in Mutasa District participant 4
TFGMUTA5	Teachers focus group discussion in Mutasa District participant 5
TFGNYA1	Teachers focus group discussion in Nyanga District participant 1
TFGNYA2	Teachers focus group discussion in Nyanga District participant 2
TFGNYA3	Teachers focus group discussion in Nyanga District participant 3
TFGNYA4	Teachers focus group discussion in Nyanga District participant 4
TFGNYA5	Teachers focus group discussion in Nyanga District participant 5

Table 4.3 shows codes used in teachers' focus group discussions. The codes, for example TFGBUH1 means Teacher (T) Focus group (FG) carried out in Buhera (BUH). The data were provided by participant number one (1) in the focus group. Participant number one (1) was the first to offer a contribution during the focus group discussion. Participant 2, 3, 4 and so on followed in giving their contribution in that order.

Table 4.4: Codes used for Community elders' Focus group discussions

Code used	**Meaning**
CFGBUH1	Community elders Focus group discussion in Buhera District participant 1
CFGBUH2	Community elders Focus group discussion in Buhera District participant 2
CFGBUH3	Community elders Focus group discussion in Buhera District participant 3
CFGBUH4	Community elders Focus group discussion in Buhera District participant 4

CFGBUH5	Community elders Focus group discussion in Buhera District participant 5
CFGCHIM1	Community elders Focus group discussion in Chimanimani District participant 1
CFGCHIM2	Community elders Focus group discussion in Chimanimani District participant 2
CFGCHIM3	Community elders Focus group discussion in Chimanimani District participant 3
CFGCHIM4	Community elders Focus group discussion in Chimanimani District participant 4
CFGCHIM5	Community elders Focus group discussion in Chimanimani District participant 5
CFGCHIP1	Community elders Focus group discussion in Chipinge District participant 1
CFGCHIP2	Community elders Focus group discussion in Chipinge District participant 2
CFGCHIP3	Community elders Focus group discussion in Chipinge District participant 3
CFGCHIP4	Community elders Focus group discussion in Chipinge District participant 4
CFGCHIP5	Community elders Focus group discussion in Chipinge District participant 5
CFGCHIP6	Community elders Focus group discussion in Chipinge District participant 6
CFGMAK1	Community elders Focus group discussion in Makoni District participant 1
CFGMAK2	Community elders Focus group discussion in Makoni District participant 2
CFGMAK3	Community elders Focus group discussion in Makoni District participant 3
CFGMAK4	Community elders Focus group discussion in Makoni District participant 4

CFGMAK5	Community elders Focus group discussion in Makoni District participant 5
CFGMUT1	Community elders Focus group discussion in Mutare District participant 1
CFGMUT2	Community elders Focus group discussion in Mutare District participant 2
CFGMUT3	Community elders Focus group discussion in Mutare District participant 3
CFGMUT4	Community elders Focus group discussion in Mutare District participant 4
CFGMUT5	Community elders Focus group discussion in Mutare District participant 5
CFGMUTA1	Community elders Focus group discussion in Mutasa District participant 1
CFGMUTA2	Community elders Focus group discussion in Mutasa District participant 2
CFGMUTA3	Community elders Focus group discussion in Mutasa District participant 3
CFGMUTA4	Community elders Focus group discussion in Mutasa District participant 4
CFGMUTA5	Community elders Focus group discussion in Mutasa District participant 5
CFGNYA1	Community elders Focus group discussion in Nyanga District participant 1
CFGNYA2	Community elders Focus group discussion in Nyanga District participant 2
CFGNYA3	Community elders Focus group discussion in Nyanga District participant 3
CFGNYA4	Community elders Focus group discussion in Nyanga District participant 4
CFGNYA5	Community elders Focus group discussion in Nyanga District participant 5

Table 4.4 shows the codes used in community elders' focus group discussions. The codes, for example CFGBUH1 means Community elders (C) focus group (FG) carried out in Buhera (BUH). The data was provided by participant number one (1) in the focus group. Participant number 1 was the first to offer a contribution during the focus group discussion. Participant 2, 3, 4 and so on followed in giving their contribution in that order.

4.2.2 Participants by Gender

The number of participants by gender involved in interviews and focus group discussions are recorded in form of tables as illustrated below:

Table 4.5: Teachers' interview participants

Site	**Gender**		**Total number of participants**
	Female	**Male**	
Buhera	1	1	2
Chimanimani	1	1	2
Chipinge	1	1	2
Makoni	1	1	2
Mutare	-	2	2
Mutasa	1	1	2
Nyanga	1	1	2
Geography Specialist	-	1	1
Curriculum Specialist	-	1	1
Sub total	6	10	16

There were more male participants (62.5%) than females (37.5%). There is still a gender bias in Zimbabwe as a result of the inherited British education system and cultural factors which tended to discriminate the girl child in accessing education (Zindi, 1996). This has resulted in fewer females as practicing Geography teachers.

Table 4.6 shows that, there were more male participants (57.1%) than females (42.9%) in the interviews as well. Traditionally in Zimbabwe, village heads are dominated by males (Tarisayi, 2017).

Table 4.6: Community elders interview participants

Site	**Gender**		**Total number of participants**
	Female	**Male**	
Buhera	-	2	2
Chimanimani	1	1	2
Chipinge	1	1	2
Makoni	1	1	2
Mutare	2	-	2
Mutasa	-	2	2
Nyanga	1	1	2
Sub total	6	8	14

The male village heads often referred to their male counterparts for the interviews. The researcher approached the village heads (leaders) in order to access the participants since the village heads are the custodians of cultural practices.

Table 4.7: Teachers' focus group participants

Site	**Gender**		**Total number of participants**
	Female	**Male**	
Buhera	1	5	6
Chimanimani	-	4	4
Chipinge	4	2	6
Makoni	3	1	4
Mutare	2	2	6
Mutasa	2	2	4
Nyanga	1	3	4
Sub total	13	19	32

A total of 32 participants participated in the focus group discussions. Females constituted 40.6% of the participants in the teachers' focus group discussion. The male participants (59.4%) constituted the bulk of the participants. Traditional and religious factors have led to parents giving an opportunity to male children (Zindi, 1996). Some parents think that it is a loss to educate the girl child who is going to be married and leave her parents (Zindi, 1996). This explains the dominance of male teacher participants in the focus group discussions.

Table 4.8: Community elders focus group participants

Site	**Gender**		**Total number of participants**
	Female	**Male**	
Buhera	-	4	4
Chimanimani	2	1	3
Chipinge	4	-	4
Makoni	2	2	4
Mutare	1	3	4
Mutasa	-	4	4
Nyanga	2	2	4
Total	11	16	27

A total of 27 Community elders participated in the focus group discussions, with an average of four members making the focus group. Patton (2002) observed that, a small number of carefully selected cases can generate substantial information. Vandeleur (2010, p.103) in studying the inclusion of indigenous technology in Curriculum 2005 (C2005) in South Africa observed that focus groups with 4 to 6 participants generated meaningful discussions.

Of particular interest is Chipinge and Mutasa Districts. In Chipinge, the village head was a woman and recommended other elderly women to take part in the focus group discussion. The invited women were those who assisted her in handling community courts. This may explain why there were more female participants. In Mutasa District, the dominance of males can be explained by the Headman's actions, as he gave an appointment day for the interviews when he was holding a communal court. The Headman had invited his assistants to be part of the focus group. He is assisted by male assistants during the communal court hearings.

4.3 PART 2: VIEWS ON IK INTEGRATION IN GEOGRAPHY

Part 1 was an explanation of the coding system used to identify participants in the research. Part 2 presents the responses to research question one (1) which sought the views of the teachers and community elders on the decolonisation of the Geography curriculum and integration of IK in the teaching of weather and climate in the secondary schools.

The main themes and sub-themes that emerged from the elders and teachers are presented in table 4.9 below.

Table 4.9: Views of community elders and teachers

Emerging main theme	Sub theme	Source
Views of Elders Integrating IK in the teaching of Geography on weather and climate promotes Zimbabwean heritage	i). Decolonisation of the curriculum and integration of IK restores national identity ii). Decolonisation of the curriculum restores cultural values	-Focus group discussion with community elders -Interviews with community elders
Views of Teachers Integrating IK improves the teaching of weather and climate in Geography	i). Learners and the community contribute to knowledge ii). Teaching becomes more interesting and learner centered iii). Integration promotes research skills and builds new knowledge amongst the learners	-Focus group discussions with teachers -Interviews with teachers

4.3.1 Integrating IK in the teaching of Geography on weather and climate promotes Zimbabwean heritage

The theme heading explains the views of the elders regarding the decolonisation of the Geography curriculum and the integration of IK in the teaching of weather and climate in Geography in the secondary schools.

4.3.1.1 Restoration of national identity

The elders viewed decolonisation of the curriculum and the integration of IK in the teaching of weather and climate as a way of restoring national identity in Zimbabwe. A headman who was part of Mutasa focus group discussion explained that their national identity is that of Black Africans with specific cultural characteristics and language:

"*Tingati isu tsika dzechivanhu dzinofanirwa kudziidziswa muzvikoro kuti vanhu vese varikuberekwa nhasi vazive kuti isu tirivanhu, nekuti isu tirivanhu takaberekwa tirivanhu, tinofanirwa kuziva tsika dzechivanhu chedu, nekuti isu tirikutora mutauro usiri wedu netsika dzisiri dzedu kwakushandisa kwatiri, asi mwana anofanirwa kukura achiziva kuti ini ndiri munhu, ndiri munhu mutema, tine tsika dzedu. Tinofarwa kuziva tsika dzedu kuti isu kwatakabva takambobva kupi uye tirikuenda kupi* (FGMUT2, 14 March 2018)

(We can say our cultural values should be taught in the schools so that all children who are born now know their national identity as people, we are African people who should know their cultural values. We are now adopting alien language and cultural values, but the new born baby should grow up knowing that he/she is an African who has his/her own cultural values. We should know our history and future).

A community elder, FGMUT2 was positive about decolonizing the Geography curriculum and he firmly believed in the integration of IK into the curriculum. The elder believed that, the national identity of a country can be restored through the teaching of the Zimbabwean culture from birth through into the school via the curriculum. FGMUT2 viewed the common use of English in Zimbabwe as foreign and advocated for the use of indigenous language in Geography teaching in the secondary schools. The elder viewed the use of the local language as a way of identifying Zimbabwe as a nation. The elder purported that a country is identified by its culture and local language use. CFGMUT2 and CFGBUH3 in the focus group discussions felt that the Geography curriculum can be decolonised by

integrating IK in the teaching of weather and climate in the secondary schools. Further, the elders believed that, decolonizing the Geography curriculum through integrating and teaching IK in the schools will restore the Zimbabwean identity which has been altered by foreign cultures and the use of a foreign language as the medium of communication.
CFGBUH3, viewed decolonisation and the integration of IK in the teaching of weather and climate as a way of restoring national identity through the teaching of indigenous tradition and culture:

"*Yeah, tinozviona kudai, ndingati chibarirwe chedu chavekupera, hazvisirizvo zvetaiona vabereki vedu vachiita. Tavekuita zviro zvisiri zvedu, zvisiri zvenyika ino, hameno kuti ndoti iculture here, haisiri yedu."* (CFGBUH3, 8 March 2018)

(Yeah, our tradition and culture has been lost. There is now a difference in culture from what our parents used to practice. We are practising foreign culture in Zimbabwe, culture which is not Zimbabwean. I am not sure whether I can call it culture, it is not our culture)

Community elders supported the decolonisation of the Geography curriculum and integrating IK in the teaching of weather and climate since their 'tradition and culture has been lost'. The elders believed that, there were now cultural differences in what their parents used to practice and what is being done at present. The elders viewed the foreign culture as contributing to the loss of the Zimbabwean identity. They therefore viewed decolonisation and the integration of IK in the teaching of weather and climate in the secondary schools as a way of restoring national identity tothe learners.

The elders also viewed the integration of IK in the teaching of weather and climate in secondary schools as a way of promoting Africanism[11]:
"Saka tinoti isu zvakakosha maningi kuti muzvikoro mudziidziswe culture yedu, kwete kuti vana vedu vaite sevana vemangezi tiri ma Africans, tinofanire kuite chi African" (FGBUH2, 8 March, 2018)

[11] Africanism in the context of this study and the views expressed by the elders was referring to African culture or unhu/ubuntu. The elders wanted the inclusion of IK in the Geography curriculum so that unhu values such as respect, love and honesty could be taught in the schools

(We say it is important to teach IK in the schools. We don't like a situation where our children behave like Europeans when we are Africans. We should practice Africanism.)

The elders believed that, the decolonisation of the curriculum and the integration of IK in the teaching of weather and climate in secondary schools was a way of promoting Africanism. The elders viewed the teaching of IK as a way of decolonizing the minds of children moving them from the Eurocentric mentality that is embedded in them by practicing Africanisn the schools.

All the community elders, FGMUT2, FGBUH2 and FGBUH3 viewed the decolonisation and integration of IK in the teaching of weather and climate in the secondary schools as a way of restoring national identity. The elders believed that, integrating IK in the Geography lessons in secondary schools was one way of restoring national identity. The elders believed that integrating IK in the Geography lessons promotes Africanism by reintroducing *unhu* values. The elders believed that the use of local language in the teaching of weather and climate promotes national identity and decolonises the Eurocentric mentality in Zimbabwean children.

MPCDO was positive that decolonisation and the integration of IK in the Geography curriculum was a way of restoring African identity that has been eroded by Western culture:

"Our culture has been terribly eroded by the western culture, integration will retain what we are as people if we bring back and infiltrate culture in our syllabus. That would mean we are going to remain as people with a culture that has been existing right from our background as Africans" (MPCDO, 15 March, 2018).

MPCDO viewed the integration of IK in the teaching of Geography as a way of 'bring(ing) back' Zimbabweans who he believes should be seen as people with a culture. The thrust of MPCDO on integration was that the African culture has been significantly eroded by the Western culture hence there is need to restore this Africanism through decolonizing the curriculum in the secondary schools. In this context the MPCDO seems to suggest that an individual is defined as African if *unhu*/ubuntu values such as love, sharing and honesty are imbued in the individual.

4.3.1.2 Restoration of cultural values

The community elders viewed the integration and teaching of IK related to weather and climate in the secondary schools as a way of restoring cultural values through re-introducing the traditional roles of aunts and uncles in educating children in the community:

> "*Chandinoona ini kuti Hurumende igare pasi vochironga kuti kuve nevanhu vanotange kudziidzisa basa ravana tete na sekuru vachipiwe maduties avo avaive navo kare.Vanakomana nevasikana vatange kudziidziswa futi chinyakare chevaisiita"* (CFGMUT2, 14 March 2018)
>
> (My view is that the Government should sit down and plan, so that there are appointed people to renew the traditional roles of aunts and grandfathers and what they used to do in the past. The family elders should start to educate the boy and girl child in the traditions they use to practice in the past).

The community elders viewed the decolonisation of the curriculum and integration of IK in the teaching of weather and climate in the secondary schools as a way of 'renewing the traditional roles of aunts and grandfathers' which was currently absent. The elders were positive that, the integration and teaching of IK in the Geography lessons ensured the restoration of the lost traditions. Community elders believed that, there should be community engagement and the twinning with government in order to facilitate traditional education of the indigenous people of Manicaland and Zimbabwe at large. The elders also viewed the integration of IK in the teaching of weather and climate as an opportunity to promote the interaction of the community with the learners and teachers. It was perceived as an opportunity to foster relationships, an opportunity for the community and learners to come together and work as a cohesive unit. They believed that the students will have an opportunity to learn their traditions and thatthis will also promote the nurturing and building of a strong relationship between the old (aunts and grandfathers) and the new generation (learners).

Community elders further believed that, the decolonisation of the Geography curriculum and integration of IK in the teaching of weather and climate in the secondary schools was a pathway to the teaching of life skills and *unhu/ubuntu* values as was argued by one of the participants:

> *"Aa kwaidziidziswa magariro ehee kana hunhu, kuzvibata, nekuti pakuroora apa unofanira kunge wasvika pazera rakati, rekuti munhu unofanirwe kuti uroore, nezvese zvavaida kuzivawo mairereno neupenyu kwavo zvaibuda".* (CFGMUTA1, 14 March, 2018)

(Yeah, People were taught life skills, *hunhu/ubuntu,* self-control, the age to engage in marital issues and any other issues they may want to know pertaining to life)

This elders' view was that integrating IK in the teaching of weather and climate allows the teaching of 'life skills and *unhu/ubuntu*' values. The elders above were positive that integrating IK in the Geography lessons promotes the teaching of social issues that are important in the lives of their children and which are currently not being addressed.

The community elders further viewed the decolonisation of the curriculum and the integration of IK in the teaching of weather and climate as a good idea of promoting social values and the teaching of traditional medicines which was losing its importance amongst the youth in preference of western medicine. One of the participants claimed that:

"Isusu tirikufunga kuti zvakanaka maningi kuti tidzokere kudzvidzidzo zvedu zvataitaurirwa nemadzitetetguru edu. Urwere hwanga husina kukura kadaro ngekaretu ngekuti taidzidziswe magarire akananaka nemadzidzisirwe ekutaure kuti unofanira kudye muti uyu, saka chidziidzocho chakanaka kuti chidzoke kutsika dzedu dzekare" CFGBHU2, 8 March 2018

(We, as elders believe that, it is a good idea that we go back to our education which we received from our grandfathers. In the past, illnesses were not so rampant because we were taught social values and traditional medicine. It is therefore good to go back to our traditions).

The community elders were positive about integrating IK in the Geography lessons as this would allow social values and the use of traditional medicines to be taught in secondary schools. In addition, the community elders believed that, indigenous education which was offered by the grandfathers and aunts instilled social values such as love, sharing and honesty among the learners. Furthermore, the community elders viewed the integration of IK as an opportunity whereby the use of traditional medicines could be taught in the secondary schools to reduce illnesses. These community elders considered the integration of IK in the Geography lessons, as a means of teaching indigenous history, African traditions and cultural values.

4.3.2 Integrating IK improves the teaching and learning of weather and climate in Geography

The theme discusses the views of teachers regarding the decolonisation of the Geography curriculum and the integration of IK in the teaching of weather and climate in the secondary schools and how it can improve learners' undederstanding as well.

4.3.2.1 Integration contributes to an understanding of concepts and the construction of ideas

The MPGI was of the view that decolonizing the Geography curriculum and integrating IK in the teaching of weather and climate in secondary schools improves the understanding of concepts and construction of new ideas. This is illustrated by an argument which was proffered by one of the participants:

> "*In teaching we are trying to construct ideas and the construction of ideas begins from one owns experiences and one's kind of background. So, if they have got this background (the learners) we are talking about, what was traditionally said about rain making, rain formation and so on, the learners are in a better position to understand this new knowledge from the WS. Once they are integrated, learners are able to develop conceptual frameworks and this will help them to understand concepts at hand. Most of the students are coming from the traditional societies where they know about these things, so there must be a relationship and a link between what they know and hear from their homes and what the Teacher teaches in the classroom. So, if the Teacher breaks that link there will be confusion among the learners"* (MPGI, 12 March, 2018).

The MPGI believed that, the construction of new ideas begins from one's experience and background. The MPGI's view is based on an assumption that the learners have a background and experiences on how rain is formed traditionally. The MPGI's view was that, the integration of the learner's background and experiences in the teaching of weather and climate help the learner to develop conceptual frameworks. MPGI is of the view that integration allows the learner to understand new concepts at hand. Furthermore, it is the view of the MPGI that, the integration of IK in the teaching of weather and climate links the learner's home experiences to what is taught in the classroom. It is interesting that this view contrasts with that of the community elders as the former believes that, leaners have knowledge gleaned from their traditional background yet the community elders were of the view that traditional knowledge

was absent amongst learners who needed IK to be inserted into the curriculum which could be beneficial to them in restoring their heritage.

Another focus group member does believe that learners have existing IK: TFGMUT2 added that, the integration of IK in the teaching of weather and climate promotes understanding as teachers teach from simple to complex ideas:

"*When we were training at Teachers' College we were taught to teach from simple to complex. I think you will be starting from what they know, from existing IK and then into scientific (Western) knowledge"* (TFGMUT2, 13 February, 2018*)*

The teacher, TFGMUT2 expressed the view that, decolonizing the Geography curriculum and integrating IK in the teaching of weather and climate allows the teaching of meteorological concepts from simple to complex. The teacher's view was that the integration of IK in the teaching of weather and climate allows teaching to begin from what the learners know from their home experience (s) which is perceived as simple because it's known to learners to western scientific knowledge which is perceived to be complex because it is unknown. The integration of IK enables learners to give examples of what they know from their community before they are engaged in western knowledge which they may not be familiar with. It is evident from the teacher's explanation that, the learner understands meteorological concepts better when teachers make use of examples taken from the learner's community/environment during teaching that is, lesson delivery on weather and climate.

Participant TFGMUT2, further elaborated on how the integration of IK links meteorological concepts with local examples:

"*We may not apply IK 100% but as for me I think it's bringing learning home and it would be quite interesting as learning would be logical. We will be linking meteorological concepts to local examples such that learning is 'closer home' for example when we are teaching on weather forecasting, we can make reference to what our Forefathers say on weather forecasting. I think as teachers we have to select some of this content but the use of IK will actually be bringing learning home and it will be easy for the learners to understand the teaching of meteorological studies" (*TFGMUT2, 13 February, 2018*)*.

TFGMUT2 conceptions were that, integrating IK in the teaching of weather and climate in the secondary schools makes learning logical since it will link to the knowledge that learners have imbibed from their homes. The integration of IK in the teaching of weather and climate allows for the linkage of meteorological concepts to local examples. The teacher was of the view that western (modern) weather forecasting can be taught together with what the Forefathers used to say in villages (indigenous weather forecasting).TFGMUT2 believed that, the integration of IK in the teaching of weather and climate '*brings learning home*', that is the gap between western knowledge and IK is closed and this makes it '*easy for the learners to understand the teaching of meteorological concepts*'.

4.3.2.2 Teaching becomes more interesting

The study revealed that the decolonisation of the Geography curriculum through the integration of IK in the geography syllabus makes the teaching of weather and climate in secondary schools more interesting, according to several participants namely TIMAK2, TICHIP1 and TFGMUT2. One of the teachers in a focus group discussion explained how the use of local examples makes lessons interesting:

"*In one* of *my lessons when I was teaching on weather and climate last term, I used IK examples, I realized that learning was so interesting and the learners were even more resourceful. I think all the learners were interested to be part of that lesson because I was teaching something they know. The students were even giving examples of IK which I was not even aware of" (*TFGMUT2, 13 February, 2018).

The findings from the teachers' interview indicated that some teachers were positive about decolonizing the curriculum by integrating IK in the teaching of weather and climate in the secondary schools with one teacher already having introduced IK into lessons. TFGMUT2 was of the view that the integration of IK in the teaching of Geography lessons allowed the use of local examples on IK. The use of local examples motivated the students to learn and it made the lesson more interesting. TFGMUT2 acknowledged that, integration of IK in the teaching of Geography concepts promoted resourcefulness amongst the learners as they were able to also give examples of their own distilled from the knowledge they gained from their community. In the lesson the learners became more creative and contributed to new knowledge

which the teacher was unaware of. It is evident from TFGMUT2 that, the integration of IK in the teaching of Geography allows the learners to add new knowledge.

Another participant, TFGMUT4 in the focus group observed that, decolonisation of the Geography curriculum through integrating IK in the teaching of weather and climate becomes interesting as it links teaching to reality:

"*Integration of IK makes teaching real as the learners would be seeing and experiencing what they are being taught"* (TFGMUT4, 13 February, 2018*)*.

The integration of IK in the teaching of weather and climate allows learners to see and experience what they are taught in the classroom, in their communities. This grounds teaching in reality and it allows for interesting learning experiences. TFGMUT4's assertion suggests that, the integration of IK in the teaching of Geography promotes discovery learning through seeing and experiencing.

The foregoing quotations from participants is significant as TFGMUT2 and TFGMUT4 agreed that integrating IK in the teaching of weather and climate makes teaching interesting, a reality and more learner centered. An example from the theme of weather that was cited indicated that, the use of local examples enhanced an understanding of meteorological concepts in Geography among the learners.

4.3.2.3 The Integration of IK promotes community engagement and learner centered approaches in teaching

Teachers in Chimanimani focus group were of the view that, the decolonisation of the Geography curriculum through the integration of IK in the teaching of weather and climate promotes community engagement between the learners, teachers and the community. One of the teachers, TFGCHIM2 proclaimed:

"*Whatever they learn from the school, when they go home, they ask the elders whether what they have learnt from school is correct. Their forefathers will also add to what has been taught from the school. So, by combining the two forms of knowledge I think we can have much. As I have said we have two sides of the story, the Teacher is teaching, the Elders at home are also*

echoing the same sentiments, then we are actually building more knowledge" (TFGCHIM2, 5 March, 2018)

TFGCHIM2 was of the view that integrating IK in the teaching of weather and climate allows the involvement of elders in teaching. Learners consult the elders on what they would have learnt from school. The elders add knowledge to what learners would have been taught at school. The teacher believed that, integrating IK into the teaching of weather and climate promotes the engagement of the community in the learning process at two sites: the school and home, as elders add to what teachers would have taught. The integration of IK into the teaching of weather and climate, allows learners to interact with the community through research on IK on weather and climate. The community is engaged in the learning process of their children and it becomes part and parcel of the education system. TFGCHIM2 considers integration as a tool through which learners, teachers and elders construct new knowledge.

The study further revealed that, the decolonisation of the curriculum and integration of IK in the teaching of weather and climate promotes participatory approaches and learner centeredness in the teaching. One of the participants (TIMUT2) elaborated:
"The major contribution on its integration to the curriculum is that it enables what I can call participatory approach for example to environmental management and rainfall patterns. It just enables the communities to take a participatory role in the management of their resources even when we talk of climatology, at least communities can predict rainfall patterns" (TIMUT2, 3 February, 2018)

TIMUT2 expressed the view that, integrating IK in the teaching of weather and climate enables the community to take a participatory approach in environmental management and rainfall patterns. TIMUT2 believed that, the integration of IK in the teaching of weather and climate engages the learners with the community elders, as the learners research from the community elders' indigenous ways of predicting rainfall patterns and indigenous land management practices. Learners carry out field research from the community on weather forecasting and contribute to environmental management issues. On the other hand, the indigenous experts provide knowledge on IK to the researchers (teachers and students). TIMUT2's explanation suggests that, integrating IK in the Geography curriculum allows all education stakeholders (teachers, learners, community elders) to contribute knowledge to the learning process unlike

a dominantly Eurocentric curriculum that does not incorporate indigenous perspectives in the classroom teaching.

Another teacher, TFGCHIM1 echoed TIMUT2's views by explaining that, the integration of IK in the teaching of weather and climate in the secondary schools was a platform to generate research materials using community elders. TFGCHIM1 explained how the community is engaged in research:

"*Yes, they can go and ask their Grannies, so that they know a lot of information, especially for research purposes they can have information on indigenous methods of weather forecasting from the community elders"* (TFGCHIM1, 5 March, 2018)

TFGCHIM1 thought that, integrating IK in the teaching of weather and climate allow learners to carry out research from the community elders on IK related to weather and climate. Research materials such as indigenous methods of weather forecasting and rain making ceremonies are generated through community engagement. It is evident from TFGCHIM1's description that, community engagement is a platform from which learners could generate IK related to weather and climate in Geography.

4.3.3 Part 2 Summary

The above discussions conclude that, the integration of IK in the teaching of weather and climate promotes Zimbabwean national heritage. It makes teaching more interesting and contributes to the generation of new ideas. Integrating IK in Geography lessons promotes community engagement in student learning. Learning becomes participatory in nature and more interesting as learners integrate knowledge from different sources: teachers and community elders. The integration of IK into the teaching of Geography lessons develops research skills in the learners as they can carry out research on IK related to weather and climate in their communities and this can serve to develop their problem-solving skills.

4.4 PART 3: HOW IK CAN FEATURE IN THE TEACHING OF WEATHER AND CLIMATE IN GEOGRAPHY

The previous part 2 explained the views of elders and teachers on the decolonisation of a section of the Geography curriculum by integrating IK in the teaching of the topic on weather and climate in Geography in the secondary schools. Part 3 presents findings that answer research question 2 which focuses on how IK can feature in the teaching of the topic on weather and climate in Geography in secondary schools. The emerging themes and sub themes for part 3 are summarized in table 4.10

Table 4.10: How IK can feature in the teaching of weather and climate

Emerging main themes	**Sub themes**	**Sources**
Pathways to IK integration into Geography curriculum	i) IK can feature through community engagement ii) IK can feature as an introduction in the teaching of weather and climate iii) IK can feature in form of selected IK concepts iv) Infusing IK with WS v) IK can feature as a separate module	-Teachers and community elders' focus group discussions -Teachers and community elders' interviews
IK can feature in the form of the local language	*i) Rudzi rwemakore (*Types of clouds*)* *ii) Mhando dzemvura(*Precipitation forms*)* *iii) Mhepo/Dutu (*Air masses) *iv) Mwaka (*Seasons*)*	-Teachers and community elders' focus group discussions -Teachers and community elders' interviews

Indigenous biological methods of weather forecasting	i) Plant morphological changes ii) Birds' migration and behaviour iii) Animal behaviour iv) Insects' presence and behavior	-Teachers and community elders' focus group discussions -Teachers and community elders' interviews
Atmospheric features and processes used by the indigenous people to forecast weather	i). *Rudzi rwemakore* (cloud type) ii). The moon and the sun iii). *Mhepo/dutu* (Air masses) iv). *Mapisire ekunze* (Air temperature)	-Teachers and community elders' focus group discussions -Teachers and community elders' interviews
IK can feature as Rain making ceremonies in weather and climate studies	i). Rain making ceremonies	-Teachers and community elders' focus group discussions -Teachers and community elders' interviews

4.4.1 Pathways to IK integration in Geography curriculum

The theme presents the findings on the views of the community elders and teachers on how IK can feature in the teaching of weather and climate in Geography in the secondary schools.

4.4.1.1 IK can feature through community engagement

The MPCDO was of the view that IK can feature in the teaching of weather and climate in the secondary schools through an engagement of the community elders in knowledge acquisition. The elders canco-teach IK practices related to weather and climate in the Geography lessons, that is they would physically enter the classrooms to complement the knowledge of the teachers:

"*Let us bring our traditional leadership into the classroom. Let us not determine a teacher by his/her qualifications, bookish qualifications because our old people have got also their qualification by virtue of their experience. Let them come into the classroom and teach and even get remunerated"* (MPCDO, 15 March, 2018).

The MPCDO believed that traditional leaders can be engaged as resource persons to teach IK related to weather and climate. The MPCDO view was that, traditional leaders qualify to do so based on the experience they have acquired over time via the oral tradition from their ancestors. The featuring of IK in the Geography lessons involves the use of traditional leadership engaging with the learners and teachers. Indigenous knowledge can feature in form of lecture presentations by elderly resource persons followed by class discussions. The MPCDO is of the view that for one to teach IK related to weather and climate, one needs to have the requisite experience in IK and not only the academic qualification. Furthermore, the MPCDO thought that, government should consider engaging the elders as part of the teaching staff who should be remunerated for their contributions. It is interesting to note that, the MPCDO recognised community experience as acquired knowledge over the years. The acquired experience by the elders, according to the MPCDO, is viewed as equivalent to qualifications obtained from institutions of higher learning.

It was further established from the community elders that, IK related to the teaching of weather and climate and other cultural values can feature in the Geography curriculum through family or community gatherings:

"*Semuenzaniso, se mubanza muno matiri ndimo maitaurirwa vana nhoroondo, nyaya dzekuvhima, kuteya mhuka, vaitaura mubanza muno. Vakomana vaiudzwa kuti vanofanirwa kusiyana nevasikana kusvika vasvika zera rakati.Vaidziidziswazve respect. Kana mwana asvika panevanhu vakuru kana vakatakura mutoro unofanira kubatsira. Vakomana vaidziidziswazve nezvemhuri dzekuroora. Dzimwe mhuri dzisina kumira zvakanaka mairambidzwakuroora. Mubanza ndimo maitaurwa nyaya, dzemaroorere kana idzo nyaya dzemamirire ekunze ne dzekurima."* (CFGMUTA2, 14 March, 2018)

(As an example, in this hut [*banza*] that is where we discussed our traditions, history, practical skills like hunting and trapping animals. The boys were taught when and how to propose love to the girls and the appropriate families to marry. The boys were also taught to respect the elders and to assist their elders where ever possible. In this hut, that is where issues on livelihoods, marriage, weather patterns and farming were discussed).

CFGMUTA2's conceptions were that, the integration of IK in the Geography lessons could revive the traditional family/community gatherings that were used to teach children IK related to weather and climate and other socio-cultural values. CFGMUTA2 argued that, males used to gather in a *banza* (traditional grass thatched hut with a half wall) to discuss the traditions, history, practical skills, marital issues, weather patterns and farming.In a separate focus group discussion, participants namely CFGCHIM1, CFGCHIM2 and CFGCHIM3 echoed CFGMUTA2's views which purported that, the revival of family/community gatherings through the integration of IK in the teaching of weather and climate could also promote the teaching of gender specific roles. CFGCHIM1 explained the gender roles taught to the girls:

"Vasikana vaidziidziswe kuimba yekubikira ndiana mbuya" (CFGCHIM1, 8 March, 2018) (Girls were taught in the cooking hut [kitchen] by grandmothers).

Another participant in the FGD added, *"Taidziidziswe kutwa, kukuya"* (CFGCHIM2, 8 March, 2018) (We were taught to thrash and grind millet)

CFGCHIM3 interjected, *"Kumukira, kwavekukuya, kutsvaire pamba, mapedza kwakuenda kumunda, mapedza kwavekuenda kuchikoro"* (CFGCHIM3, 8 March, 2018). (We were taught to wake up early in the morning to thrash and grind millet, sweeping the homestead after that we then went to work in the fields, from there we then go to school).

The three community elders namely CFGCHIM1, CFGCHIM2 and CFGCHIM3 concurred that, the integration of IK in the teaching of weather and climate in the secondary schools revives family/community gatherings where children are taught genderspecific roles and practical skills. The girls were taught to thrash and grind millet, sweeping the homestead and working in the fields. On the other hand, boys were taught survival skills such as hunting,

trapping animals and farming. It is evident from the FGD with the community elders that, the education system of the elders was practically oriented but gendered. It prepared the boys and girls for adulthood but gendered roles and expectations. The discussion with the community elders showed that family gatherings could be used to teach children IK related to weather and climate and other indigenous values such as respect for the elders.

4.4.1.2 IK can feature as an introduction in the teaching of weather and climate

The discussion with the teachers revealed that, IK can feature in the teaching of weather and climate as an introduction to the lesson through the use of traditional songs related to weather and climate elements:

"*I will ask children to sing traditional songs in the introduction*" (TFGMAK3, 28 April, 2018). The teacher was of the view that children could be asked to sing traditional songs as an introduction to the lesson on weather and climate.

Another teacher suggested the following traditional song for use as an introduction to teach a lesson on rainfall:

"*Mvura naya-naya tidye magwere* "*Mvura naya-naya;*

Gidhi, gidhi chirombo;

Mvura naya naya tidye magwere".

(Come rains, come;

Gidhi, gidhi chirombo [Children referring to the sound of thunder and lightning]

Come rains, come so that we can eat maize cobs)" (TFGCHIP5, 6 March, 2018).

The song is sung repeating the same phrase 'come rains, come rains so that we eat maize cobs'. The song is sung by children in a jovial mood looking in the sky. The idea is that if it rains the maize crop grows well and yields a good crop. This song is usually sung in villages when there

is a cloudy atmosphere and it's about to rain. TFGCHIP5 indicated that, they would use the song in the introduction of the lesson in topics like cloud cover, rainfall types and patterns.

Another teacher, TFGCHIP4 proposed the following traditional song that can feature in the teaching of weather and climate in the introduction:

"*Zuva-zuva nderedu, bvute-bvute ndera Ishe*" (TFGCHIP4, 6 March, 2018).

(Sun shine, sun shine is ours; Shade, shade is for the Lord)

TFGCHIP4 suggested that, the traditional song, "*Sun shine, sun shine is ours; Shade, shade is for the Lord*" can feature as an introduction in the teaching of weather and climate as IK is integrated in the Geography curriculum. The teacher's view was that this song below could be used when introducing a lesson on temperature:

"*Zuva-zuva nderedu, bvute-bvute ndera Ishe*;

Zuva-zuva nderedu, bvute-bvute ndera Ishe;

Ukatambira muzuva unotemwa nemusoro;

Ukatambira muzuva unotemwa nemusoro;

Chando chasvika hokoyo nachando;

Chando chasvika hokoyo nachando;

chando chinotonhora"

(Sun shine, sun shine is ours; Shade, shade is for the Lord;

Sun shine, sun shine is ours; Shade, shade is for the Lord;

If you play in the sun you suffer from headaches;

If you play in the sun you suffer from headaches;

Winter is here, beware of cold temperatures;

Winter is here, beware of cold temperatures.)

TFGCHIP4 and TFGCHIP5 suggested that IK is used to develop the lesson. The teachers agreed that, the prior knowledge the learners might have from their home background (traditional songs in this case) could feature in the introduction as a link of the learner's prior experiences to the new lesson (weather elements). The teachers appear to be suggesting IK as an equal to WS but strangely they were only suggesting its mediocre use (as songs) in the teaching to introduce Western concepts. Once the lesson has been introduced, the role of IK ends for some teachers, in the lesson.

4.4.1.3 IK can feature in the form of selected concepts

The findings from other teachers revealed that, selected aspects of IK related to weather and climate can feature in the Geography lessons in secondary schools: One of the teachers, TFGMUT1 illustrated how IK concepts can be integrated:

"*The way we incorporate, you do it like a person who is taking fish in which you take the flesh and leave out the bones, take the positive ones that are linked to our Geography, weather and climate and then we leave that one we condemn, that which does not link"* (TFGMUT1, 13 February, 2018).

TFGMUT1 expressed that, only selected IK concepts linked to the study of weather and climate must feature in the teaching of the topic. TFGMUT1 was of the view that those IK concepts that are condemned by the community and lack linkages to weather and climate should be left out in the teaching of Geography lessons.

TFGMUT1 further suggested that, only appropriate indigenous content linked to weather and climate could be selected. Examples of content that can be selected for inclusion in the teaching of the topic on weather and climate include indigenous methods of weather forecasting (Table 4.12); rain making ceremonies; local language terms (Table 4.11) used to describe meteorological concepts and indigenous pedagogy such as the use of traditional songs. TFGMUT1 was aware of some IK concepts which are good and supposed to feature in the teaching of weather and climate. In this scenario, TFGMUT1 decided what constitutes knowledge that should feature in the teaching of weather and climate. There is therefore subjective in the selection of content for teaching. The integration of IK can therefore depend on the teacher's background, experiences and belief systems.

In another focus group discussion, TFGCHIM3, stated that, selected concepts for teaching weather and climate in the secondary schools can feature as IK examples taken from the local community. TFGCHIM3 elaborated on how selected aspects of IK can feature in the Geography lessons as other members in the group nodded their heads in agreement:

"*Perhaps you teach the WS part of it, and then as you go you give examples of the traditional knowledge on weather so that you try to put them together. Take science there and you put examples from the local traditional knowledge"* (TFGCHIM3, 5 March, 2018)

TFGCHIM3 suggested that, the integration of IK and WS in the teaching of weather and climate can feature in the form of giving examples of the traditional knowledge on weather and marrying it with WS explanations. For the teacher, TFGCHIM3, the featuring of IK examples in the teaching of weather and climate is to complement the teaching of WS.

4.4.1.4 Infusing IK with WS

The findings from teachers revealed that, the integration of IK can feature in the teaching of weather and climate through an infusion of common aspects of IK and WS. TIMUTA1 used an example of thunderstorms and rain formation to illustrate how IK can be infused in the teaching of weather and climate:

"*One thing we are certain about thunderstorms is that, students from both worlds have an appreciation of the causes of thunderstorms and what they can do when there are thunderstorms. For example, in WS just like with indigenous science they say if you stay outside on open space you get struck by lightning, at least we can integrate that in Geography syllabus. When the rainy season approaches, people burn leaves and logs in preparation for the farming season. The indigenous people call this 'kupisa mavivi' (burning branches of trees). Kupisa mavivi (burning branches of trees) can be taught together with condensation nuclei when teaching rain formation."* (TIMUTA1, 3 February, 2018).

The teacher was of the view that students in both worlds (indigenous and western) have an appreciation of the causes of thunderstorms and the precautionary measures they take against thunderstorms. This knowledge is common in both the indigenous and western world views. The teacher suggested that, the common knowledge can therefore be infused in the teaching of weather and climate in the secondary schools.

The other common ground between the indigenous and western science that can be infused into the teaching of weather and climate is on condensation nuclei. Indigenous people practice what is called *kupisa mavivi* (burning branches of trees) as stated above, when preparing their fields. Western Scienceregards the burning of tree branches (*kupisa mavivi*) as a cause for the formation of condensation in the atmosphere. There is common ground on the understanding of the concept of condensation nuclei from both the indigenous and western world views. This can be infused into the teaching of rain formation in secondary schools.

TFGCHIM2 further suggested how the infusion of IK can be effected through the use of the questioning technique during the delivery of a lesson on weather and climate:

"*When do we experience some rains? What do your elders say are the signs of a pending rain season? What conditions are necessary for rain to occur? When you see stock birds what do you expect? So, you can go concurrently to teach this, and ask those questions so that you actually involve them in the discussion, a participatory approach, so that they also participate giving their views and try to integrate them in understanding"* (TFGCHIM2,5 March, 2018)

TFGCHIM2 believed that IK infusion in the teaching of weather and climate can feature through class discussion and questions on IK asked by the teacher. The teacher demonstrated how IK can be infused through the use of the questioning technique, the involvement of learners in whole class discussions on IK and the use of the participatory approach (interactive method of learning) during the Geography lessons. The teacher believed that, the infusion of IK in the teaching of weather and climate in the secondary schools can be done through use of appropriate teaching strategies.

4.4.1.5 IK can feature as a separate module/project

The findings from the teachers showed that IK can feature as a separate module or as a research project in the teaching of weather and climate in the secondary schools. One of the participants, TFGBUH7 elaborated:

"*A student may choose a project and the project is done in a certain area so that it may not disadvantage those pupils that live in other areas*" (TFGBUH7, 9 March, 2018).

Another participant echoed, "*May be if the integration is done in the form of a project which is carried out in specific provinces or areas it can be assessed well*" (TFGBUH1, 9 March, 2018).

TFGBUH7 and TFGBUH1 believed that, the integration of IK related to weather and climate can feature in the Geography curriculum as a separate module or research project carried out in a specific geographical area of the learner's choice, so that it may not disadvantage those pupils that live in other areas who have access to different knowledge from their elders. Learners discover IK related to weather and climate by conducting research in the community. In this case learners are given a task to do a project on IK related to weather and climate. With this approach IK is studied as a standalone topic, separate from the western Geography content that is taught in the classroom. This approach may mean that learners can choose aspects of IK they want to research and concentrate their project on that unless the curriculum stipulates the exact topic.

TFGCHIP1 in a FGD echoed the views of TFGBUH7on teaching IK concepts as a module or research project:

"Yes, we teach them separately, that scientists say for rainfall to be formed there must be ascendancy of air, as it rises it cools, it condenses and so on, however you go on to discuss the traditional aspect (referring to indigenous explanation). You make children aware of both processes" (TFGCHIP1, 6 March, 2018).

TFGCHIP1 believed that, the IK explanation for rain formation should feature separately from the WS explanation. The teacher's view was to first teach, the western concepts of rain formation that includes the ascendancy of air, its cooling and condensation. After the WS explanation of rain formation is presented, the teacher then would explain rain making ceremonies practiced by the indigenous people. According to TFGCHIP1, the explanation of rain formation is presented in the lesson separately to that of the story of the ceremonies. TFGCHIP1 was clear that the two forms of knowledge on rain formation cannot be taught together, but the way in which it could be used in a lesson indicated that they could actually be complementary activities in classroom teaching and learning. The teacher would teach IK separate to western ideas. For TFGCHIP1 there was no linkage between IK and WS on rain

formation. The separatist approach was likely to be adopted by teachers who do not believe in IK as a science and one that can be integrated with other forms of knowledge.

4.4.2 IK can feature in form of local language usage

The study sought to identify the indigenous language used in Manicaland to describe atmospheric phenomena that can feature in the study of weather and climate in the secondary schools. The findings on the use of meteorological terms in the local language that can feature in the teaching of weather and climate in secondary schools are summarized in table 4.11.

Table 4.11: Local language use in the study of weather and climate

WS (English) terminology in the current topic of weather and climate	**Local language use (Shona) that can be integrated and feature in the teaching of weather and climate**
Cloud Types:	***Rudzi rwemakore*:**
Cumulonimbus	*Mvumi*
Nimbostratus	*Gore rehore*
Cirrus	*Rutseto/Hanga*
Precipitation forms:	***Mhando yemvura:***
Cyclonic rainfall	*Mvura yepanosangana mhepo dzakasiyana/mvura yehore*
Convectional rainfall	*Senyeka*
Relief Rainfall	*Mvura yemumakomo*
Drizzle	*Mubvumbi*
Fog	*Mhute*
Dew	*Beto/dova*
Ice	*Chando*
Winter rains	*Mavhurachando*
Pre summer rains	*Bvumiramutondo*
Post harvest rains	*Gukurahundi*
Air masses:	***Mhepo:***
Westerly winds	*Mhepo yekumavirira/Nhuruka*

Easterly winds	*Mhepo yekumabvazuva*
Southerly winds	*Mhepo yembambara*
Seasons:	***Mwaka:***
Summer /Rain season	*Zhizha*
Autumn/Harvesting season	*Matsutso*
Cold season	*Nguva yechando/chando*
Hot and dry season	*Chirimo*

Source: Field interviews and FGD with teachers and community elders

It is evident that, the local *Shona* language does have terms used in the study of weather and climate equivalent to the WS terminology in English.

4.4.2.1 Rudzi rwemakore (Types of clouds)

Teachers namely TFGBUH6, TFGBUH1, TFGBUH2 and TFGMUT2 concurred that there are *mvumi* (cumulus) and *ruseto* (stratus) clouds in the local *Shona* language that can feature in the teaching of weather and climate in the secondary schools. Teacher, TFGMUT2 explained the two common types of clouds:

"*I have maybe 3-4 different names of clouds used to be said by my mother. My mother used to say, if you see mvumi dzamira (clouds with vertical extension) referring to cumulus clouds, it shows we are expecting to have some rainfall. Then we have the cirrus clouds. My mother used to say, ukaona mudenga mava nemakore ehanga/ruseto mvura yavekuda kunaya (if you see the sky covered by clouds that looks like feathers of a guinea fowl it is about to rain)"* (TFGMUT2, 13 February, 2018)

The teachers suggested that cirrus clouds can feature as *mvumi* (cumulus) in the Geography curriculum. The cloud has got a vertical extension which is referred to as *mvumi dzamira* in the local language. *Dzamira* in the local *Shona* dialect means to stand up vertically. Clouds with a vertical extension are called cumulus in the current Geography syllabus. The local community expects some rains once they observe the appearance of *mvumi* (cumulus clouds).

TFGMUT2 further revealed that cirrus clouds in the current Geography syllabus can feature as '*makore ehanga or ruseto'* in the teaching of cirrus clouds in secondary schools.

Another teacher described *ruseto* (cirrus clouds) as illustrated:
"*Ruseto rwakati, twe-twe*" (TFGBHU1, 9 March 2018) (Ruseto is a cloud which has some fine lines)
"Those are cirrus clouds" (TFGBHU2, 9 March 2018)

TFGBHU1 described *ruseto* (cirrus) clouds as consisting of some lines or forming a linear pattern. The description of *ruseto* clouds by TFGBHU1 concurs with the one that was given by TFGMUT2.and TFGMUT2 who gave a description of '*ruseto* as *makore ehanga'* (feathers of a guinea fowl). The feathers of a guinea fowl show a linear pattern. The richness of the description is evident in the simile used for the cirrus clouds as that of the feathers of a guinea fowl.

The teachers' description of *ruseto* (cirrus) clouds was also confirmed by the community elders:
"Maruseto anooneka nekuita mangarangata-ngarangata kuite mahanga. Mukaona asimuka mvura yavekuda kunaya" (CFGCHIP1, 8 March, 2018). (*Ruseto* are feathery like. If you see them developing, you know rainfall is about to fall).
Both teachers and community elders agreed that *ruseto* (cirrus) clouds are feathery in appearance and they signify the coming of the rains.

The findings from the teachers' focus group discussions revealed that nimbostratus clouds can feature as "*gore rehore*" in the local language (*Shona*) in the teaching of clouds in the secondary schools. TFGMUT3 described it as a dark grey cloud associated with heavy down pours. *"Gore rehore therefore give mvura yehore*" (continuous rain) or cyclonic rains (TFGMUT3, 13 February, 2018).

4.4.2.2 Mhando dzemvura (Precipitation forms)

The teachers were asked about some of the terminology in the local language that is used to describe *mhando dzemvura* (precipitation forms) that could feature in the teaching of weather and climate in the secondary schools.

The researcher found that, thunderstorms can feature as *senyeka* in the local language in teaching the rainfall types in the secondary schools:

"*KwaSave uku (pointing to the west) ndikwo kunobva mhepo inonzi nhuruka. Mhepo yacho yaiunze senyeka* (CFGCHIM2, 8 March, 2018)

(From Save [pointing to the west] that is where an air mass called *nhuruka* [westerly air mass] comes from. The air mass brings *senyeka* /thunderstorms)

Senyeka is rainfall caused by a westerly air mass called *nhuruka*. The air mass blows from Save (Save is to the west) to the east.

Another teacher added: "*Senyeka makore anotanga kuratidza kuti mvura irikuuya yakasimba. Makore acho anenge akasviba"* (CFGCHIM1, 8 March, 2018)

(The coming of *senyeka* rain is shown by dark clouds covering the sky)

CFGCHIM1and CFGCHIM2 agreed that *senyeka* is characterized by dark coloured clouds that cover the whole sky. The dark coloured cloud produces heavy down pours. *Senyeka* is also associated with *nhuruka* (westerly winds). The wind blows from the west to the east. The description of *senyeka* is similar to that of thunderstorms. This type of rainfall can therefore be integrated in the Geography curriculum and it can feature in the teaching of nimbostratus clouds (dark coloured clouds) that covers the sky before a downpour. Related to *senyeka* (thunderstorms) is '*mvura yembambara'* (heavy down pours) (TFGNYA3, 15 February, 2018). This refers specifically to heavy down pours caused by southerly winds unlike *senyeka* that is caused by *nhuruka* (westerly winds).

The teachers revealed that drizzle can feature in the in local language as '*guti'*

"*Guti* is prolonged rainfall, usually we call it *mubvumbi*" (TFGCHIM2, 5 March, 2018) or '*mubvumbi*' (TFGMAK1, 28 April, 2018). The teacher is of the view that drizzle can feature as *guti/mubvumbi* in the teaching of rainfall types in the local language.

Both teachers, TFGCHIM2 and TFGMAK1 agreed that prolonged rain (drizzle in the current Geography syllabus) is called *mubvumbi/guti* in the local language. The terminology (*mubvumbi/guti*) can be integrated in the Geography curriculum and it feature in the teaching of precipitation forms in the study of weather and climate in the secondary schools.

Furthermore, teachers in the Makoni FGD concurred that, there are three types of rainfall known by the indigenous people in their local language which are not in the current Geography syllabus yet they are important to be integrated in the Geography curriculum and feature in the teaching of rainfall types: One of the teachers, TFGMAK1 elaborated while the other members concurred by nodding their heads as a sign of approval:

"*Then we have rainfall that falls after harvesting, we call it gukurahundi. It was meant to wash away remnants after pouncing millet on the dwalas. Then there is that which falls at the beginning of winter, they call it mavurachando. Bvumiramitondo comes before summer around August. That will lead to sprouting of trees"* (TFGMAK1, 28 April, 2018).

The other teachers concurred (by nodding their heads) with TFGMAK1 that, the three types of rainfall known as *gukurahundi, mavurachando and bvumiramitondo,* in the local language can be integrated in the Geography curriculum and feature in the teaching of rainfall types in secondary schools.

Gukurahundi is the type of rainfall that falls after people have pounded millet on the *dwalas* leaving behind some chuff. The rains wash away the millet residues. *Mavurachando* is rain that is experienced at the start of the winter season. The rains contribute to the cold conditions at the onset of the winter season in the Southern hemisphere. *Bvumiramitondo* contributes to sprouting of trees such as *mnondo* and *msasa* around August.

The researcher observed that, in the existing Geography syllabus there are mainly three types of rainfall namely convectional, relief and cyclonic rainfall. The Eurocentric classification of these rainfall types was based on the process of rain formation. On the other hand, the Afrocentric/Indigenous classification of rainfall types namely *gukurahundi, mavurachondo* and *bvumiramitondo* is based on function provided by the rainfall type. *Gukurahundi* rain washes away millet residue from the dwalas after winnowing. *Mavurachando* heralds the onset of cold winter conditions and *bvumiramitondo* causes the sprouting of new leaves on trees such as *mnondo* at the onset of the summer season. It is thus evident that, there is a litany of concepts and their explanations in weather and climate in the local language which resonates with current western concepts and explanations and this can be included in the Geography syllabus.

4.4.2.3 Mhepo/Dutu (Air masses)

The findings from the community elders revealed that, the indigenous people of Manicaland have knowledge on different *mhepo*/air masses. The most common is *nhuruka* (westerly winds) and *mhepo yekumabvazuva* (easterly winds) as elaborated by one of the teachers:

"*KwaSave uku (pointing to the west) ndikwo kunobva mhepo inonzi nhuruka. Mhepo yacho yaiunze senyeka* (CFGCHIM2, 8 March, 2018)

(From Save [pointing to the west] that is where an air mass called *nhuruka* [westerly air mass] come from. The air mass brings *senyeka* /thunderstorm).

Nhuruka is an air mass that blows from Save River (westerly direction) and brings in *senyeka* (thunderstorm) over large areas of Manicaland. The community elders believe that the study of *nhuruka* (westerly winds) in their local language can feature in the teaching of air masses in the Geography curriculum in secondary schools.

Another elder in the same focus group with CFGCHIM2 concurred on the nature of *nhuruka* (westerly winds):

"*Yaibva ngeino mhepo yechidai (vachiratidza nechigunwe mhepo inobva mabvazuwa ichienda kumadokero) kunorovera asi ikange yavekubva nekwa Save kudai (vachiratidza nechigunwe kubva kumadokero kuenda kumabvazuva) mvura yaakuuya"* (CFGCHIM3, 8 March, 2018)

(When an air mass blows from the east to the west (pointing from the east to the west) it will be building up moisture in the west, but when the air mass is blowing from the direction of Save River to the east (pointing with a finger from the west to the east) rainfall is expected.

The community elder stated that two types of air masses could feature in the teaching of weather and climate. The elder identified *mhepo yekumabvazuva* (an air mass that blows from the east to the west). This air mass picks up moisture from the Indian Ocean and builds it up as it moves to the west. The other type of air mass is the westerly winds or *nhuruka* that brings rain to most areas in Manicaland.

Another community elder, CFGCHIP1 concurred on the two types of air masses (*mhepo yemabvazuwa and nhuruka*):

"*Mhepo dzinofamba takadziidziswe kuti kana nguwa yekurima yoode kusvika munozwa mhepo ichibve mabvazuwa ichienda kumadokero, kwai kuronda kwainenge ichiita kubva Mozambique.kana mhepo yobva kumavirira toziva kuti mvura yavekuda kunaya. Ndiyo yatinoti nhuruka"* (CFGCHIP1, 8 March, 2018)

(We were told by our elders that, when it is time to start farming, you experience an air mass from *mabvazuva* (easterly winds) blowing in the western direction. The elders say the easterly air mass from Mozambique will be building up moisture in the west. When the air mass blows from *mavirira* (west) to the east, we know that it is about to rain. This air mass is what we call *nhuruka*)

The explanation by the elder suggests that, there are two types of air masses in their local language that could be integrated in the Geography curriculum and feature in the teaching of air masses in the secondary schools. These two types of air masses are *mhepo yekumabvazuva* (easterly winds) that picks up moisture from Mozambique and *mhepo yekumavirira/nhuruka* (westerly winds), that brings some rains to the region.

4.4.2.4 Mwaka (Seasons)

Participants were asked to describe the seasons in Zimbabwe in their local language. The study establishedthat, the indigenous people have local terms they use to describe seasons that could feature in the teaching of seasons in secondary schools:

"*The Shona (local language) term for dry season is chirimo, nguwa yechirimo or nguva yechando meaning cool dry season (winter) and the other season is zhizha/matsutso which is the summer season or wet season*" (TFGMUT1, 13 February, 2018).

The teacher suggested that seasons like *chirimo* (cool dry season) and *zhizha* (summer season) are local language terms that could feature in the teaching of seasons in Geography.

Another elder in an interview added on the description of seasons:
"*Kupisa ndicho chirimo; zhizha inguwa yekunaya; matsutso inguwa yatinodye chibage yavanoti autumn muchirungu; kutonhora ndicho chando"* (CIMUTA1, 15 March, 2018)
(Hot and dry conditions is *chirimo* season; *zhizha* is rainy season; *matsutso* is time for harvesting maize cobs, which they refer to as autumn in English; cold conditions refer to *chando* season)

The elder suggested that, the four seasons in the local language could be integrated in the Geography curriculum and feature in the teaching of *mwaka*/seasons. The seasons suggested for integration in Geography are *chirimo* (hot and dry season); *zhizha* (rain season); *matsutso* (harvesting season) and *chando* (cold season). It is evident that the seasons are derived from the agricultural lifestyle of the indigenous people.

TFGMUT1 and CIMUTA1 agreed on the points that there are two seasons (*chirimo* and *zhizha*). The teacher identified *chirimo* and *zhizha* seasons whereas the community elder came up with four seasons (*chando, zhizha, matsutso* and *chirimo*). The elder possibly came out with more seasons from his experience as an elderly person as well as being a retired teacher. The teacher and the community elder are of the view that these four seasons in the local language could be integrated in the Geography curriculum and can feature in the teaching of seasons under the topic of weather and climate.

4.4.3 Indigenous biological methods of weather forecasting

This theme presents findings on aspects of the flora and fauna that the indigenous people believed should be integrated into the Geography curriculum and could feature in the teaching of the topic on weather and climate in the secondary schools. The findings on the indigenous methods of weather forecasting are summarized in Table 4.12

Table 4.12: Changes in Flora and Fauna that can be used in weather forecasting

Indicators used to predict weather by Indigenous People	**Description of indicators**	**Interpretation of indicators on weather forecast**
Plants morphological changes		
Mnondo (Julbernardia globiflora*)* *Msasa* (Brachystegia Spiciforms)*,* *mupfuti* (Brachystegia boehmii) *Muonde* (Fig tree)	Sprouting new leaves	*Zhizha*/Beginning of rain season; hot conditions; conditions of instability
	Shedding leaves	*Chirimo*/Dry season; dry conditions; windy

Mazhanje (Uapaca kirkian) *Mhuri* (Fruit tree) Chakata (Parinari Curatellifolia) Mango	Abundance of fruits	Pending dry conditions; low rainfall
Lichens (Grass on bare rock)	Change to yellowish colour	Rains will come within two days or so
	Changes to green when wet	Wet conditions
Birds migration and behaviour		
Mariti (Stock birds)	Presence of stock birds	Beginning of summer season
Magwirokwiro (Stock birds) *Haya bird* (rain bird)	Singing of haya bird	Rains in the near future
Mherepere (Swallow birds)	Swallows flying at high altitude	Clear weather (stable weather)
	Swallow flying low at low altitude	Cloud cover, moist atmosphere (unstable weather)
Huku (Chicks/fowls)	Moving around when raining	Predicts rainfall of long duration
Animal behaviour		
Makudo (Baboons)	Baboons searching planted seeds	Drought conditions
Mhuru dzemombe (calves of cows)	Calves running around and jumping with raised tails waved in the air	Cool breeze, humid atmosphere, pending rains
Maronda (Injuries on human beings)	Painful injured parts of the body	Pending humid, cool or wet conditions
Insects' presence and behaviour		

Masvosve/Zviteza (Ants)	Taking food into the mound sealing off the openings on the mound	Pending rains in the near future
Nyenze (Cicadas)	Singing continuously	Hot weather and pending convectional rainfall
Ishwa (Flying termites)	Flying around	Humid atmosphere and ground surface; pending rains
Mukonikoni (Dragon flies)	Flying around	Hot and humid atmosphere; pending rains
Dandemutande (Spiders)	Crawling around frequently	Hot, humid and pending rains

Source: Field interviews and FGD with teachers and community elders

4.4.3.1 Plant morphological changes

The findings from the community elders established that, plant morphological changes are used to forecast weather. Knowledge of plant changes that is used to predict weather could be integrated into the Geography curriculum and it could feature in the teaching of weather forecasting in the study of weather forecasting in secondary schools. One of the participants, CFGBUH1 stated how changes in flora could be used to predict the amount of rainfall expected:

"*Mukaona muonde wopfumvutira, mvura yavepadhuze, mukaona kuine chakata igore renzara"* (CFGBUH1, 8 March, 2018). (When we experience trees like *muonde* [figtree] sprouting new leaves we know that the rain season is near and when we observe plenty of fruits from *muchakata* tree [*Parinari curatellifolia*] we know there will be drought).

The sprouting of new leaves from trees such as *muonde* (fig tree) was a sign of a pending rain season. The trees would have shaded off their leaves in the dry season. CFGBUH1 also believed that, when fruit trees such as *muchakata* (*Parinari curatellifolia)* produce a lot of fruits, it was a sign of a drought season about to arrive.

The assertion by CFGBHU1, that the sprouting of trees was a sign of the onset of the summer season was also confirmed by other participants namely CFGMUT1, CFGMUT2 and TFGMUT3. These participants cited *mnondo* (Julbernardia globiflora)*, msasa* (Brachystegia Spiciforms) and *mupfuti* (Brachystegia boehmii) as most common trees that shed off leaves during the dry season and sprout at the onset of the rain season. Community elders and the teachers agreed that floral morphological changes could feature in the Geography syllabus in the study of weather forecasting.

Further on morphological changes, the community elders in Mutasa were positive that, the changing colour of lichens to predict weather conditions should feature in the Geography curriculum as it was a reliable predictor of weather changes. CFGMUTA2 elaborated on how changes in lichens are used to predict weather changes in Mutasa District:

"*Kuno kuneruware, pane uswa hunomera paruware. Izvozvi mukatarisa mukatarisa kuchinaya sekwakadaiso munoona uswa hwacho huri green.Kungaita 2 days kusina kunaya mvura uswa huya munoona hwavekuita yellowish. Asi kana hwaita yellowish hakuperi mazuva maviri kunobva kwanaya*" (CFGMUTA2, 14 March, 2018)
(There are bare rocks in this area where lichens grow. This changes colour from green when it is moist to yellowish under dry conditions. But once it turns yellowish, it will only take about two days for rains to be received).
Other elders in the focus group discussion nodded their heads in agreement with the explanation given by CFGMUTA2. Lichens are green when the atmosphere is moist and change to yellow under dry conditions. The elders agreed that, the knowledge on the changes in the colour of lichens could be integrated in the Geography syllabus and feature under the topic on weather forecasting. The yellow colour is possibly due to excessive evapo-transpiration resulting in the loss of moisture from the grass. As the rain falls, the grass absorbs the moisture and becomes turgid and green.

4.4.3.2 Birds' migration and behaviour

The discussions with the community elders established that bird's migration and behaviour are used to predict weather patterns. The elders believed that, this knowledge of birds' migration and behaviour to predict weather could be integrated in the Geography curriculum and they could feature in the teaching of weather forecasting in secondary schools:

An elder in Mutasa District, demonstrated the sound produced by the *haya* bird (rain bird) when it is about to rain:

"*Haya ukanzwa yavekuti tsvo-tsvo-tsvotsvotsvo wobva waziva kuti kwavekuda kunaya"* (CFGMUTA3, 14 March, 2018) (If you hear the *haya* bird (the rain bird) squeaking continuously, you would know it is about to rain).

CFGMUTA3 thought that, the squeaking of the *haya* bird (rain bird) continuously is a good sign that rainfall is expected soon. The *haya* bird was cited by many participants as a good indicator of the coming of the rains. The bird was described in some districts according to the sound it produces when squeaking. It was referred to as '*dzvotsvotsvo'* by CIMUT1; CIBUH2 and CICHIP2 in the south-east and western parts of Manicaland. *Dzvotsvotsvo* is a continuous sound produced by the rain bird that resembles the falling of the rain. When the rain bird squeaks once or twice, it is interpreted to mean that there will be no rain in the near future.

It was further observed that, community elders predict the impending rain season by observing the presence of migratory birds referred to as *magwirokwiro* and *riti* (stock birds). One of the teachers explained:

"Tikatanga kuona magwirokwiro nemariti, atisinganyanyi kuona, vanhu vanobva vati mvura yavepedyo kunaya" (CFGBUH1, 9 March, 2018). (When we start to see stork birds which we normally do not see, people would say rain is about to come).

CFGBUH1 believed that, the presence of *magwirokwiro* and *mariti* (stork birds) which are not normally seen, was an indication that rain is coming in the near future. The elder was of the view that the migration of stork birds can feature in the teaching of weather forecasting in secondary schools. The stork birds migrate into Zimbabwe in search of food at the beginning of the rain season in summer in the Southern hemisphere. The summer season is wet and it is associated with flourishing insects and sprouting grass for the stock birds to feed on during the summer season. In the northern hemisphere there will be dry conditions and therefore the stork birds migrate to the south.

The study further established that, the use of the behaviour of fowls for predicting the duration of rainfall could be integrated in the Geography curriculum and this could also feature in the teaching of forecasting rainfall and its duration as explained by one of the teachers:

"*Kune issue yehuku, kana mvura ikanaya then idzo dzobuda dzichitsvaga chekudya belief yacho ndeyekuti kana huku dzikafamba mvura ichirikunaya kudaro mvura ino prolonger"* (TFGBUH2, 9 March, 2018).
(There is the belief that if chicks come out of the brood in search of food while it is still raining, the rain is going to take a long duration of about one to two weeks).

TFGBUH2 observed that, if chicks move out of the brood in search of food when it is raining it indicates that the rains would be experienced for a long period of time. Usually the fowls will come out to search for food because there will be some light drizzles that can last for a long period of time.
It is evident from the participants namely CFGMUTA3, CICHIM1 and CFGBUH1 that, changes in the behaviour of birds (squeaking, movement, feeding pattern) could be used in predicting rainfall type and duration and therefore this could be integrated in the teaching of weather forecasting in the secondary schools.

4.4.3.3 Animal behaviour

Findings from the community elders revealed that, changes in animal behaviour is used to predict weather patterns and therefore it can be integrated into the Geography curriculum and feature in the teaching of weather forecasting. One of the participants. CFGBUH3 stated that:
"*Mukaona matede achitsvare makomba atinenge tachera zvinoreva kuti kunenzara kwenguwa refu"* (CFGBHU3, 8 March, 2018)
(If you see baboons uncovering planted seeds it is a sign of a prolonged drought)

CFGBHU3 alleged that, the uncovering of planted seeds by baboons is used to predict prolonged drought conditions. Usually baboons come into the fields to eat maize cobs but when they come to eat planted maize seeds it means drought conditions would have spanned over a long period. This suggests that there will be very little food for the baboons left in the forests and little to expect in the near future. CFGBHU3 believed that, such knowledge on the behavior

of baboons, is useful in the study of long-term weather forecasting and it could be integrated in secondary school Geography lessons.

In an interview, another elder concurred with CFGBHU3 that, animal behaviour can be used to predict weather conditions by explaining how calves behave when rainfall is expected within a short period of time:

"*Vana vemombe vanoringinyuka wobva woziva kuti mvura yoda kunaya*". (CIMUT1, 29 January, 2018)

(When cattle calves run around raising their tails in the air, it is a sign of pending rains).

CIMUT1 believed that, the behaviour of calves can feature in the teaching of short-term weather forecasting in the Geography lessons. Calves run around raising their tails in the air when it is about to rain.

The research further established that, even human beings react to weather changes as indicated by one of the teachers:

"*Vechikuru vanoti*, *ndikanzwa musana uchirwadza kurikuda kuita makore nekutonhora*" (TFGCHIM4, 5 March, 2018)

(Elderly people would say, if I feel a backache, there is most likely to be cloudy and cold conditions)

It was apparent from TFGCHIM4's explanation that, the backache experienced by elders can feature in the teaching of weather and climate to predict imminent humid, cloudy and cold conditions in the near future.

4.4.3.4 Insects' presence and behaviour

Teachers in the Chimanimani FGD concurred that the presence and behaviour of insects is used to predict weather patterns. The teachers felt that knowledge on the presence and behaviour of insects can be integrated in the Geography curriculum and feature in the teaching of weather and climate studies under the topic of weather forecasting in secondary schools. The teachers gave the following responses:

"*Zvanzi mukaona ma white butter flies achikwidza kudai (pointing to the east) inenge iri sign yemvura"* (TFGCHIM1, 5 March, 2018)

(It is said if you see white butterflies flying to the east; it is a sign of approaching rainfall)

"*Maspiders akafambafamba zvinozi kwavakuda kuita guti"* (TFGCHIM4, 5 March, 2018)

(If spiders are running around it is believed that *guti* [continuous light rain] is expected in the near future)

"Then kunenyaya yemasvosve, ma ants, tukange twavekubuda sitereki pasi apa, mvura inenge yavekuda kunaya" (TFGCHIM3, 5 March, 2018)
(Then there is the issue of ants, if they come out from their mounds in large numbers, rain is expected in the near future)
TFGCMIM1 believed that, when *mabepeteswa* (white butterflies) migrate to the east it is a good sign of an imminent rain period. TFGCHIM4 observed that the running around of *dandemutande* (spiders) predicts an approaching *guti* (cloudy) conditions. TFGCHIM3 viewed the coming out of *zvitedza* (ants) from their mounds as a sign of pending rains.
It was evident from the three teachers, TFGCHIM3, TFGCHIM4 and TFGCHIM1 in the FGD that, the presence and movement of insects signifies wet conditions in the near future. They believed that, use of IK on insects in predicting weather can be integrated and can feature in the study of short-term weather forecasting in Geography in the secondary schools.

TFGMUT1 in a different FGD concurred with TFGCHIM3, TFGCHIM4 and TFGCHIM1 that, the presence and movement of insects is indicative of wet conditions and went on to suggest that some insects like *nyenze* (cicadas) produce a lot of noise to signify the coming of the rains. TFGMUT1 indicated that:

"*Eeeh, for example you can teach kuti there are sounds produced by nyenze, it shows kuti the rains are coming"* (TFGMUT1,13 February, 2018)
(Eeeh, for example, you can teach that, there are sounds produced by *nyenze* [cicadas], it shows that the rains are coming)
The insects produce continuous sounds with their wings to show that the rains are coming. This is common on a hot day just before the summer season. They make excessive noises when it is extremely hot. This is usually followed by convectional rains which is associated with thunder and lightning.

4.4.4 Atmospheric features and processes used by the indigenous people to forecast weather

This theme presents atmospheric features commonly used by the indigenous people. The teachers and community elders believed that it should feature in the teaching of weather and

climate in the secondary schools. Table 4.13 is a summary of the atmospheric features and processes that are used by the indigenous people (Ndau, Samanyika, Maungwe, VaBocha) in Manicaland to forecast weather conditions.

Table 4.13: Atmospheric features and processes used for weather forecasting

Indicators used to predict weather by indigenous People	**Description of indicators**	**Interpretation of indicators on weather forecast**
***Makore* (Clouds)**	*Ruseto* (Cirrus)	Rain within the next two weeks; Associated with a coming warm front
	Mvumi (Cumulus/Cumulonimbus)	Rains expected within a short period of time
	Mhute (Mist)	Gloomy weather in the morning which may clear off later on
Mwedzi (Moon)	*Mwedziwafa* (Moon in the last quarter) *Mwedziwabarwa* (Moon in the first quarter)	Clouds and rain during the period
	Jenaguru (Full moon)	Clear skies and dry conditions expected; Hot during the day
Dziva remvura pazuva/pamwedzi (Sun/Moon halo[12])	*Dziva guru pazuva/pamwedzi* (Large sized sun/moon halo)	More rains expected in the near future
	Dziva diki pazuva/pamwedzi (Small sized sun/moon halo)	Little rain expected in the near future
Gwara renyeredzi/Gwara rakurumbi (Milky way)	Central position of milk way in the sky	Summer season

[12] Sun or moon halo is a circle of cirrus clouds around the sun or moon. It is caused by refraction of minute water droplets in the cloud. It is associated with the coming of a warm front.

	Northerly position of milky way	Winter season is approaching
Murarabungu (Rainbow)	Appearance in the sky during rainfall	Rains stops within a short period of time
***Mhepo/Dutu* (Air Masses)**	High frequency of whirlwind (*Chamupupuri*)	Hot, dry and unstable weather; dry season
	Easterly winds (*Mhepo yekumabvazuva*)	Localized rains in the east parts of Manicand and Zimbabwe
	Westerly winds (*Nhuruka/ Mhepo yekumavirira*)	Wide spread rains experienced in all parts of Manicaland and Zimbabwe; bumper harvest
Mapisire ekunze (Temperature)	*Kupisa* (High temperatures)	Expectations of heavy rains later in the afternoon or in the near future; Warmth during the pre –summer period heralds a wetter summer.
	Kutonhora (low temperatures)	Little rains expected in the coming season

Source: Field interviews and Focus group discussions with community elders and teachers

4.4.4.1 Makore (Clouds)

The participants believed that the knowledge on cloud types should be integrated in the Geography curriculum and feature in the teaching of weather forecasting. The most common clouds that were used by the local people to predict weather patterns which the participants believed could feature in the teaching of weather forecasting in the schools are *mvumi* (cumulus) and *ruseto* (cirrus) clouds:

"*I have may be 3-4 different names of clouds used to be said by my mother. My mother used to say, if you see mvumi dzamira (clouds with vertical extension, referring to cumulus clouds), it shows we are expecting to have some rainfall. Then we have the cirrus clouds. My mother used*

to say, ukaona mudenga mava nemakore ehanga/ruseto mvura yavekuda kunaya(if you see the sky covered by clouds that looks like feathers of a guinea fowl it is about to rain)"(TFGMUT2, 13 February, 2018)

TFGMUT2 identified two types of clouds they believe should feature in the Geography lessons on weather forecasting. These were described as *mvumi* (cumulus) whose development shows rainfall which is expected. *Mvumi dzamira* refers to clouds with vertical extension in form. The second type referred explained by TFGMUT2 that was used by the local community to predict weather is *ruseto* (cirrus). *Ruseto* appears like feathers of a guinea fowl. TFGMUT2 believed that, once the sky is covered by *ruseto* (cirrus) it is about to rain. Furthermore, the teacher was positive about integrating the two types of clouds in the study of weather forecasting in the secondary schools.

CFGCHIP concurred with TFGMUT2, that, *ruseto* clouds are feathery in appearance and are used to predict the coming of the rains:
"Maruseto anooneka nekuita mangarangata-ngarangata kuite mahanga. Mukaona asimuka mvura yavekuda kunaya"(CFGCHIP1, 8 March, 2018). (*Ruseto* are feathery like. If you see them developing you know rain is about to fall).

Ruseto clouds were described by the community elder as feathery in appearance. The community elder concurred with the teacher that cloud form and appearance can feature in the Geography lessons on weather forecasting. In another focus group discussion, the teachers acknowledged that the occurrence of cirrus cloud is a good indicator of a pending and prolonged rain period as explained by TFGMUT2, TFGBHU1 and TFGBHU2.

4.4.4.2 The moon and the sun

The community elders believed that, the moon's phases can feature in the study of weather and climate in secondary schools when predicting weather patterns. CFGCHIP explained how moon phases are used to interpret weather patterns as follows:

"*Kana mwedzi wosvibirwa/mwedziwafa mvura yavekude kunaya"* (CFGCHIP3, 8 March, 2018).
(Rainfall is expected to fall in the last quarter of the moon (*kana mwedzi wosvibirwa/mwedziwafa*)

CFGCHIP1 in a FGD interjected and added the following:

"*Zvinoreva kuti mwedzi unenge wobuda kwavekusviba. Ehe, nekuti uchatawa uchabve kubarwa mwedzi mvura inouyazve"* (CFGCHIP1, 8 March, 2018).
(It means when the moon is now rising at dusk or during the night [last quarter of the moon] rainfall is expected. Yes, in the first quarter rain is again expected).
The elder is of the view that rainfall is expected in the first (*uchatawa, uchabve kubarwa*) and last quarter (*mwedzi unenge wobuda kwavekusviba*) of the moon.

CFGCHIP1 and CFGCHIP3 concurred that rainfall was expected to fall during the first quarter (waxing) of the phase of the moon (*uchatawa, uchabve kubarwa*) and during the last quarter (*mwedzi unenge wobuda kwavekusviba*) of the moon (waning). The elders do not therefore expect to receive rain during the full moon (*jenaguru*). Indigenous science sometimes depends on inference. The elders would have observed the phenomenon for a long period of time and then drew conclusions.

The research further established that, the moon/sun halo can feature in the Geography syllabus as a weather instrument to forecast the rains and its quantities. CIMUT1 in Mutare urban elaborated how the moon /sun halo is used to forecast the amount of rainfall expected arguing that:
"*Panoita denderedzwa pamwedzi kana pazuwa. Iroro denderedzwa idziva remvura rinopangidza kuwanda kwayo mvura. Rinenge rakasvibira rakakura rinoratidza kuwanda kwayo mvura. Kana mvura irishoma kanoita kadiki kasikanasi kuoneka"* (CIMUT1, 29 January, 2018).
(There is a circle of cloud that develops around the moon or sun (*Dziva remvura in Shona dialect*). This circle is sun/moon halo. It shows the amount of rainfall. A large circle of dark cloud shows that more rains are expected. When there is little rain expected, the size of the circle is small and difficult to see).

CIMUT1 believed that, the size of the circle of cloud that develops around the moon or sun can feature in the teaching of weather forecasting to predict the amount of rainfall expected. There is a relationship between the size of the circle (moon/sun halo) and the amount of rainfall expected. The bigger the circle around the moon /sun, the more rains will be expected to fall. The colour of the cloud surrounding the moon/sun is also important in determining the amount

of rainfall. A dark cloud surrounding the moon/sun is a sign that more rains would fall. The elder was positive that the integration of the moon/sun halo in the Geography was important in the studies of weather forecasting in secondary schools.

4.4.4.3 Mhepo/dutu (Airmasses)

Findings from the community elders revealed that, indigenous people of Manicaland have knowledge of indigenous terms they use to describe different air masses/*mhepo* that could be integrated in the teaching of Geography lessons. One of the elderly participants CFGCHIM2 explained how their forefathers used their experience of air masses to predict weather:

"Vana baba vaiti nhuruka ikange yobve ino (pointinting to the west) vobva vati iii !!! mvura youya. Mhepo iyi yaiunze makore akasviba ne mvura yesenyeka" (CFGCHIM2, 8 March, 2018).(Our fathers used to say if air is blowing from the west (*nhuruka*) they would say iii! Rain is coming. The air mass blowing from the west would bring in some dark clouds and heavy rains (*senyeka*)

CFGCHIM2 believed that, an air mass blowing from the west to the east (*nhuruka*) would bring into their area dark clouds and heavy rains. The elder's view was that, air masses could be integrated in the Geography curriculum and feature in the studies of weather and climate as one method of forecasting cloud type and nature of rainfall expected. The elder suggested that an air mass which blows from the west (*nhuruka*) was associated with dark clouds (nimbostratus) and heavy rains (*senyeka*).

In another FGD in Buhera the community elders echoed the existence of an air mass called *nhuruka* as they proclaimed:

"*Pane inonzi nhuruka"* (CFGBUH1, 8 March, 2018); (We have what we call *nhuruka)*

"*Inobvakumaiirira mhepo yacho*" (CFGBUH2, 8 March, 2018) (It blows from the west to the east).

"*Aah nhuruka inounza mvura kwayo, ndiyo inoita kuti tiibvise nzvimbo ino"* (CFGBUH1, 8 March, 2018) (It brings in good rains and causes us to have a bumper harvest).

CFGCHIM2, CFGBUH1 and CFGBUH2 concurred that *nhuruka* is used to predict weather. They agreed that *nhuruka* is an air mass which blows from the west. CFGBUH1 and CFGCHIM2 agreed that *nhuruka* brings heavy down pours. CFGCHIM2 described the nature of rain brought by *nhurka* air mass as *senyeka* (heavy down pours). CFGBUH1 was of the view that *nhuruka* brings in good rains that result in a bumper harvest.

There is also *chamupupuri* (whirlwind) which is used to predict weather and seasons as illustrated by an elder in Buhera District: "*Mungaona zvipupuri maningi moziwe kuti mvura irikude kunaya*" (CFGBUH3, 8 March, 2018)

(If we experience high frequency of whirlwind, we know that it is about to rain)

The high frequency of whirlwind (*chamupupuri*) indicates the coming of the rains. *Chamupupuri* means some objects such as papers, dry leaves and dust are being blown into the sky by a circulating air mass. The description of the rising up of objects suggests unstable conditions in the atmosphere which could lead to rainfall. There is logic in the elder's interpretation that the high frequency of *chamupupuri* is used to predict the coming of the rains and therefore it can feature in the teaching of the topic on weather forecasting in secondary schools.

4.4.4.4 Mapisire ekunze (Temperature)

The study revealed that atmospheric temperature conditions is used by the community of Manicaland to forecast weather conditions. The community believed that, the knowledge on either *kupisa kwekunze* (heat) of the environment or *kutonhora* (cold) of the environment can be integrated in the Geography curriculum and feature in the teaching of weather forecasting in the secondary schools. A teacher (TFGBUH5, 9 March, 2018) in a FGD in Buhera District explained how the community interprets temperatures to forecast weather and seasonal patterns:

"At times the elders talk about temperatures. High temperatures would mean we are going to expect some rains very soon. If it is cold there is no rain in the coming season"

The teacher's view on how temperatures are used to predict weather was confirmed by an elder (CFGCHIM2) in a focus group in Chimanimani who stated that:

"*Kwaiti kukatonhora zviya, vakuru voti mvura hakuna, kwopisa voti mvura yaapasinde pekunaya"* (CFGCHIM2, 8 March, 2018)

(The elders used to say, if it is cold there is no rain expected; when it is hot, rain is expected in the near future).

The teacher and the community elder agreed that atmospheric temperatures can be integrated and feature in the studies on weather and climate. A teacher, TFGBUH5 and an elder, CFGCHIM2 suggest that there is a relationship between temperature and the occurrence of rainfall. The community expected to receive some rains once they experience high atmospheric temperatures. High temperatures may cause vertical uplift of air and instability resulting in rain formation. Furthermore, both CFGCHIM2 and TFGBUH5 agreed that, when they experience cold temperatures, they do not expect to receive rain in the near future. Low temperatures resist the uplifting of air which would cause stability and fair-weather conditions.

4.4.5 IK can feature as rain making ceremonies in weather and climate studies

The theme presents the findings on rain making ceremonies that, community elders and teachers felt should feature in the Geography curriculum in the teaching of weather and climate in the secondary schools.

4.4.5.1 Rain making ceremonies

The study found that, in Manicaland, indigenous people emphasise rain making ceremonies which they feel should feature in the teaching of rainfall formation in Geography lessons in secondary schools. CFGCHIP1 explained the different types of rain related ceremonies as follows:

"*Madzimambo ne maSabhuku vane zvikwasha zvavo zvavanodire doro remusoso/mukwerere rekupemhe mvura. Saka izvozvi gore rino akabika, rinouya haabiki, ndipo panozozwi anokwanisa vaye vabike zvitsanza munongoti ture-ture kumucheteyo anodira musingaridzi mhururu"* (CFGCHIP1, 8 March, 2018)

(Chiefs and headman have sacred places where they offer *musoso/mukwerere* (rain making ceremony beer) to the ancestors as they request for rains. They alternate brewing *musoso* in

one year and *zvitsanza* in the other year. The beer for *zvitsanza* is placed in different places at the margins of farms. *Zvitsanza* beer does not involve ululation as is the case with *musoso*).

CFGCHIP1 gave prominence to sacred places which they associate with the ancestors from where they appeal for rains. The elder, CFGCHIP1 explained the two types of rain making ceremonies that are performed to the ancestors. There is *musoso* rain making ceremony beer which is offered to the ancestors at the sacred places. *Musoso* is characterized by ululation (*kuridza mhururu*) as they seek some rains from the ancestors. The second type of rain making beer offered to the ancestors is *zvitsanza* which is placed at different points at the margins of farming land.

The view by CFGCHIP1 that, chiefs and headman have sacred places where they offer beer to their ancestors and appeal for rain was confirmed in separate interviews across the province. In north east of Manicaland, CFGMUTA2 confirmed that, the brewing of the beer is done in *Mabinga* (mountainous forest area) in the Mutasa-Nyanga area; *Kushara* (forest where chiefs are buried) in Chief Satiya's area, in the eastern part of Manicaland as revealed by CFGCHIM1 and CICHIM1; *Nyamazha* (forest area) in Chief Muusha's area (CICHIM1) and *Mugwasha* (forest in Ngaone) in the southern part of Manicaland (CFGCHIP3).

The explanation by CFGCHIP1 suggests that, ancestors are attached to certain objects such as sacred places. At the same time the elder reveals that, there is communication between the living and the ancestors. This communication is conveyed through rain making ceremonies where beer is an important component.

CFGCHIM2 explained the purpose and process of *musos*o rain making ceremony beer as follows:

"*Doro remusoso nderekupira vadzimu. Vanhu vaibve kure vachiuya pa mupanda waive apa (pointing the position where mupanda tree was). Vakuru vemuno vese vaiungana vachibika doro raiiswa mumusasa. Vaiteme masanzu kwavekusosa vana baba vachirarapo vasaiende kumhatso"* (CFGCHIM2, 8 March, 2018).

(*Musoso* is beer brewed and offered to the ancestors. People from all corners of the community gather under a *mupanda* tree [lonchocrpus capassa] Community elders gather brewing the beer

which is placed in a *musasa* [temporary enclosure]. The elders sleep inside the enclosure constructed from the tree branches until the process of brewing the beer is over).

The explanation given by CFGCHIM2 shows that, the rain making ceremony beer (*musoso*) has special conditions. Firstly, the beer is brewed by elderly people. The second aspect that characterises *musoso* beer is that, it is brewed under a temporary enclosure (*musasa*) constructed out of tree branches. The third aspect is that, there is sacredness in the way the beer is brewed. The elders sleep in the enclosure for the period the beer is brewed. The element of purity is important for the ancestral spirits to accept the offering. The fourth element is the spirit of *ubuntu* that is portrayed through the sharing of the beer with people from all corners of the community.

4. 4.6 DOCUMENTARY ANALYSIS OF THE GEOGRAPHY SYLLABUS

The Ministry of Primary and Secondary Education Geography syllabus, forms 1-4, 2015-2022 was analysed. The focus of analyzing the syllabus was the topic on weather and climate since it is the thrust of the study. Document analysis was done in order to answer research question 2 as presented below:
How can indigenous knowledge feature in the teaching of the topic on weather and climate in Geography in the secondary schools?

The basis for analysing the Geography syllabus was informed by theoretical frameworks that guided the study as elaborated in chapter 2 of the thesis. The analysis of the documents was important in the study as this points to the need for integrating IK in the teaching of weather and climate in secondary schools. The units of analysis were the preamble, aims of the syllabus, the content coverage and teaching methods. I read through the documents focusing on the section on weather and climate. As I read through, I identified aspects that could be integrated with indigenous knowledge.

The Geography syllabus, form 1-4, 2015 – 2022 shows some possibilities of integrating IK in the teaching of weather and climate. The rationale (section 1.2) of the syllabus indicates that the Geography syllabus is designed to make learners appreciate diversity and make informed

decisions. Integration of IK in the Geography syllabus therefore allows learners to appreciate the co-existence of different forms of knowledge including indigenous knowledge.

Section 1.5 p.1 of the Geography syllabus is on cross - cutting themes. There are eight (8) themes stated there. The analysis of the themes established that there are three cross cutting themes relevant for integration with IK in the teaching of weather and climate in secondary schools. These themes are: environmental issues, heritage and climate change. Environmental issues are important since IK is studied as a whole. Heritage issues such as rain making ceremonies are also central in understanding indigenous knowledge. Climate change can be studied together with indigenous methods of weather forecasting used by the indigenous people of Manicaland (see sections 4.43; 4.4.4 and 4.4.5 of this thesis).

There are seven (7) aims in the form 1-4 Geography syllabus. Of these seven it was found that three (3) of them provide an opportunity for integrating IK in the teaching of weather and climate in secondary schools. These three aims are stated below:

3.2 develop practical skills of enquiry, observation, recording and interpretation of geographical
Information;
3.3 promote an understanding of environmental management issues;
3.5 develop in learners an understanding of societal issues, climate change and disaster risk management;
3.6 develop an appreciation of diverse communities and cultures worldwide.

Indigenous knowledge relies on observation and interpretation of the environment to predict weather patterns. Aim (3.2; 3.3 and 3.5) can thus be achieved through integrating IK in the teaching of weather and climate. The integration of indigenous knowledge in the Geography syllabus ensures that the knowledge and cultures of different communities are integrated in the teaching of Geography as suggested by aim 3.6 of the Geography syllabus.

The suggested methods of teaching in the Geography syllabus (section5.2 p.2) were found to be learner centered and consistent with methods of teaching used by the indigenous people of Manicaland when teaching their children. The suggested methods of teaching in the syllabus

are demonstrations; field work; games; simulations; debates; laboratory work and experiments, group work and discussions.

The form 1-4 Geography syllabus was found to have content that could be integrated with indigenous knowledge in the teaching of weather and climate. Table 4.14 shows topics in the geography syllabus and corresponding IK content that could be integrated in the teaching of weather and climate.

Table 4.14: Geography Syllabus (forms 1-4) and IK content

Geography Syllabus (forms 1-4) topics	**Possible Indigenous knowledge content for integration**
Weather data- weather elements	Repeated observation of the environment
Types of rainfall	• Senyeka (thunderstorms) • Mvurayembambara (heavy downpours) • Mvurayechando (winter rains)
1.Weather forecasting 2. Climate change	• Biological methods of weather forecasting • Changes in the atmospheric conditions • Spirit mediums
1.Air masses 2. Weather hazards	• Mhepo yekumabvazuva (easterly winds • Nhuruka (westerly winds)

Table 4.14 illustrates the possibilities of integrating IK in the teaching of weather and climate in secondary schools. Participants have revealed the different types of rainfall in the indigenous terminology that could be integrated in the teaching of weather and climate (refer to section 4.4.2 of the thesis). The indigenous people of Manicaland have also ways in which they forecast weather (refer to section 4.4.3; 4.4.4 and 4.4.5). Further, the Manicaland

indigenous community established that, there are different types of airmasses that can be identified in the local language and useful for teaching airmasses (refer to section 4.4.2.3).

4.4.7 Part 3 Summary

In Part 3 the research has revealed that IK can feature as pedagogy and as content. There is a pedagogical debate in which IK can feature in the studies of weather and climate. It was established that IK can be integrated and it can feature in the classroom teaching as an introduction to the lesson; as infused IK knowledge with selected IK concepts in the existing curriculum in the development of the lesson; or it can be a separate module on IK.

The research further expressed that, IK can feature in the teaching of weather and climate through the medium of the local language to describe and explain meteorological concepts in Geography. It was observed that the local people have rich indigenous terminology to describe atmospheric phenomena and processes such as air masses, clouds, precipitation forms and seasons which can feather in the studies of weather and climate.

Furthermore, the study established that IK can feature in the teaching of meteorology as cultural practices and experiences. This can be unpacked in the form of various indigenous methods of predicting weather. These indigenous ways of predicting weather include indigenous biological methods such as the use of plant morphological changes and the presence and behaviour of birds, insects and animals. It also emerged that, atmospheric features such as the moon/sun, cloud types and direction of air movement are used in weather forecasting by the local people and can therefore feature in the study of weather and climate.

The study further established that, the spiritual world forms the foundation of indigenous people of Manicaland's belief systems and cultural practices. The elders believed that their ancestors can interact with them through rain making ceremonies. The appeased ancestors would in turn provide the community with a fruitful rain seasons free of environmental hazards. The *ubuntu* values have been found to permeate their cultural practices. Lastly, findings from

documentary analysis has shown that there are possibilities of integrating IK in the teaching of weather and climate in secondary schools

4.5 PART 4: CHALLENGES IN INTEGRATING IK IN THE TEACHING OF WEATHER AND CLIMATE

The previous part 3 discussed how IK can feature in the teaching of weather and climate in the secondary schools. Part 4 presents the challenges that may hamper the integration of IK into the teaching of weather and climate in Geography in the secondary schools. The challenges found from the community elders are presented first (from the focus groups and interviews) followed by those from the teachers (from the focus groups and interviews). Table 4.15 summarizes the main themes and sub themes of the challenges in integrating IK into teaching of Geography lessons on weather and climate.

Table 4.15: Challenges in integrating IK into teaching

Emerging main theme	Sub theme	Source
Modernization poses a challenge to IK integration in the teaching of weather and climate	i). Missionary activities as a challenge to the integration of IK ii). Education and formal employment iii). Media and technology iv). Government policies on children rights	-FGD with community elders -Interviews with community elders
Pedagogical challenges on IK integration	i). Lack of documented resources ii). Lack of training by teachers in IK iii). Shortage of resource persons iv). Teachers' prior experiences and background on indigenous practices	-Interviews with teachers and educational administrators -FGD with teachers

	v). Religious beliefs vi). Urbanisation vii). Assessment challenges	

Source: Field interviews and Focus group discussions with community elders and teachers

4.5.1 Modernization poses a challenge to IK integration in the teaching of weather and climate

The theme focuses on how community elders and teachers view modernisation in Zimbabwe as a challenge to the integration of indigenous practices in the teaching of weather and climate in Geography in secondary schools. The section starts off by discussing common challenges that emerged from both community elders and teachers followed by those that emerged from the elders only. The modern developments perceived by elders and teachers to be a hindrance to IK integration in Geography lessons are missionary, religious activities and shortage of indigenous experts.

4.5.1.1 Missionary activities as a challenge to IK integration

The findings from community elders revealed that IK integration in the Geography curriculum and the teaching of IK related to weather and climate in the secondary schools is hampered by missionary activities and churches that preached against indigenous cultural practices. CFGCHIM1 explained:

"*Regai ndikutaurirei, Mufundisi emene akauya paMarijeki kushumaira izwi ndiye akati doro vanhu vasabika" (CFGCHIM1, 8 March, 2018).* (Let me tell you, The Priest himself came to Marijeki to preach against brewing beer).

"*Haitobiki izwai peya, haibiki doro revadzimu church yakauya ne colonization"* (CFGCHIM1, 8 March, 2018) *(*The church that was brought into this country by colonization does not allow the brewing of beer for ancestral spirits).

"Ikozvino manjozi hakusisina, zvipunha hakusisina, zvese zvakanyarara" (CFGCHIM1, 8 March,(Nowadays, the ancestral spirits are no longer doing what they use to do in the past as a result of church activities)

The quotations from CFGCHIM1in regard to the priest's teachings against the brewing of traditional beer is a hindrance to integrating and the teaching of IK related to weather and climate in the secondary schools. The elder blamed the failure by the local community to brew beer for ceremonies such as rainmaking, on churches that came into Zimbabwe during colonization. The elder suggested that, the ancestral spirits were no longer doing what they use to do in the past because of church activities. The community elder regarded the brewing of beer as central to the practice of traditional ceremonies such as rain making. The brewing of beer for ceremonies was viewed by the elder as linking the living with the ancestral spirits. The elder viewed the failure to practice these ceremonies and the absence of people possessed by ancestral spirits as an impediment to IK integration and teaching in the Geography lessons in secondary schools.

In an interview in Mutasa District, CIMUTA2 supported the views by CFGCHIM1 on brewing beer for the rain making ceremony. CIMUTA2 concurred that, churches associated indigenous practices with something that is devil or a heathen practice and this can be a challenge to the integration and teaching of IK in the Geography lessons in secondary schools as CIMUTA2 stated:

"*Pane mamwe machurch vanotora tsika sechinhu chiri kunzi devil, haachatori setsika wavekutora word rekuti tsika wobva waona kuti chihedheni*" (CIMUTA2, 14 March 2018) (There are some churches that associate indigenous cultural values with the devil or heathen).

The elders were of the view that, some doctrines of certain churches regard indigenous cultural values as linked to the devil or heathen practices. Indigenous practices are considered by churches to be against the teachings of Christianity. The elders' views suggested that those who believe in Christianity may resist the integration of IK in Geography lessons due to the preaching in church.

4.5.1.2 Religious beliefs

Interviews and FGD with teachers established that, Christian education is a challenge to the integration of IK in the teaching of weather and climate in Geography in the secondary schools as stated by TFGMUT2:

"*And even some of the schools themselves like we have the Catholic schools, we have the Adventist schools, they can even come to an extent of selecting some of the content to teach"* (TFGMUT2, 13 February, 2018).

Teachers felt that, the integration of IK in the teaching of weather and climate can be hampered by religious institutions that can select some of the content to teach in the institutions under their control. In Zimbabwe there are schools that are run by churches such as Catholic and Adventist schools. The schools have their philosophies, norms and values which they feel should be instilled at their school. Responsible authorities can influence the curriculum to be taught in the schools. This poses a challenge to the integration of IK in the teaching of weather and climate in Geography.

Christian beliefs by parents was also viewed by MPCDO as a challenge to the integration of IK in the teaching of weather and climate in the secondary schools. MPCDO explained the influence of parents on their children's participation in traditional dances in schools:

"*Introducing IK is going to be controversial and difficult because some of the parents themselves believe in Christian education and have an influence on their children. This is why up to this day very few (referring to children) can play indigenous dance at a school, yet every child can sing Christian songs."* (MPCDO, 15 March, 2018)

The MPCDO viewed parents' belief in Christian education as a challenge to the integration and teaching of IK in Geography lessons. Parents are promoting Christian values as opposed to IK. It was evident from the MPCDO explanation that, failure by students to play traditional dance at a school yet the same students can sing Christian songs was a sign of parents viewing Christian education as being superior to indigenous education.

Teacher, TFGCHIP4, concurred with the views of MPCDO that, Christianity in Zimbabwe is overriding indigenous tradition making it a challenge to integrate and teach IK in the study of weather and climate in Geography in secondary schools. TFGCHIP elaborated:

"*Right now, our generation grew up when Christianity was overriding these traditions. So now instead of mukwerere (rain making ceremony) we are saying if we go and fast and pray rain will come. God will intervene*." (TFGCHIP4, 6 March, 2018).

TFGCHIP4 viewed the dominance of Christianity and Christian education as a challenge to the integration and teaching of IK in the study of weather and climate in Geography. TFGCHIP4 viewed the role of indigenous practice of *mukwerere* (rainmaking ceremonies) being overtaken by fasting and praying for the rains. Further, there was the view that the new generation of teachers and students have grown up in an environment where Christianity is viewed as modernity and indigenous practices are viewed as ancient and backward. This poses a challenge to accepting IK in the teaching of Geography lessons in secondary schools.

4.5.1.3 Shortage of indigenous experts

The findings from both teachers and community elders revealed that, the scarcity of elderly people who are knowledgeable on IK poses a challenge to the integration and teaching of IK in Geography lessons in the secondary schools as explained by CFGMUT2:

"I think one of the challenges of integrating IK may be in urban set up, it may be so challenging to get someone, an elderly IK expert who can actually come to help in delivering such a lesson" (CFGMUT2, 13 February 2018)

CFGMUT2 believed that, in urban areas, the integration and teaching of IK in the Geography lessons in secondary schools could be hampered by the shortage indigenous experts who could help in the delivery of Geography lessons that is related to weather and climate. The challenge is that, elderly people in urban areas in Zimbabwe often retire to their rural homes once they are no longer employed in these urban areas. This creates a shortage of elderly people who are supposed to be consulted as indigenous experts who can be invited to teach IK in the Geography class in the urban areas.

CFGCHIM4 echoed that, the shortage of indigenous experts is a challenge in integrating and teaching of IK in Geography under the topic of weather and climate:

"*Then another challenge is that, the elderly people vatove vashomawo vatori knowledgeable nezvinhu izvozvi, saka kuti vana vati vanotsvage kuna ani vanozvishaya, it can be a challenge iyoyi"* (CFGCHIM4, 5 March, 2018)

(Then another challenge is that, the elderly people who are knowledgeable are now few nowadays. As a result, learners have nowhere to research issues on IK. This can be a challenge).

CFGCHIM4 perceived that, the shortage of indigenous experts was a challenge in integrating IK in the teaching of Geography since this would hamper research by the learners. The learners would find it difficult to undertake research on indigenous issues if indigenous experts were not available to consult.

MPGI concurred with the teachers that, the shortage of elderly people is an impediment to the integration and teaching of IK in the Geography lessons:

"The biggest challenge is the source of information. Most of IK information we have is oral. We have to extract it from a live person. Right now, there are not many efficient sources on IK systems on weather and so on. That would be a challenge because when you are to integrate you must be fully knowledgeable about what you want to teach and so on. I think this is one biggest challenge especially for people in urban areas here, who are no longer in touch with real African tradition" (MPGI, 12 March, 2018)

The MPGI believed that, the challenge of integrating and teaching of IK in the Geography lessons on weather and climate in secondary schools is the lack of efficient sources on IK systems especially for people in urban areas who are no longer in touch with African tradition. The Geography inspector viewed urban dwellers as a challenge of integrating and teaching of IK since they lacked knowledge on African traditions.

The MPGI concurred with CFGCHIM4 and CFGMUT2 that, the shortage of elderly people especially in urban areas presents a challenge in the integration and teaching of IK during lessons on weather and climate in Geography in secondary schools.

The next sections present IK integration challenges that emerged from the interviews and FGD with community elders only.

4.5.1.4 Education and formal employment

The research found that the integration of IK in the teaching of weather and climate in Geography in the secondary schools is hampered by the disintegration of families. CFGCHIM1 elaborated:

"*Zvekudziidzisa tsika nemagarire edu zviriko asi zvave musha ngemusha, zvavakuenda nevabereki, nekuti kwava ne vabereki vechimanjemanje, Havana nguva yekuti vanogara pasi nevana vachitaure tsika idzodzo* ---" (CFGCHIM1, 14 March, 2018).

(The teaching of indigenous cultural values is still practised but it now varies from one family to another because now there are westernised parents who do not have time to sit down with their children to discuss indigenous culture).

CFGCHIM1 viewed westernised parents as a challenge to integrating and teaching IK during the Geography lessons since some parents are no longer teaching their children indigenous cultural values due to urbanisation. Parents no longer have enough time to sit down and discuss cultural values with their children. In Zimbabwe, family members are living apart due to urbanisation and formal employment. In some family's elderly members who used to teach the children traditions and culture are now renting accommodation in different parts of urban areas. This makes it difficult for parents to educate their children about IK because these members are living elsewhere.

The failure by parents to engage their children in discussing their traditions and culture poses a challenge to IK integration and teaching in Geography lessons. On the other hand, the elder viewed the teaching of IK as needing to take place within the family unit or within the community. For the elder, integration of IK in the teaching of weather and climate involves the community and the school building a relationship that contributes to imparting IK knowledge to the learners.

The findings from the elders revealed that, the integration and teaching of IK in Geography under the topic of weather and climate faces a challenge arising from people acquiring formal education. CFGMUTA2 explained:

"*Ndingati tsika dzave kuraswa ngenyaya yedziidzo nekuti nyaya yetsika vanhu vavekurasa tsika vachitora sechinhu chisina basa --- saka dziidzo yanga yave ku contributor panyaya yekuraswa kwetsika.*" (CFGMUTA2, March 2018) (I would say cultural values are being lost because these cultural values are being taken as something insignificant. Western education is contributing to the loss of indigenous culture).

It is evident from the explanation by CFGMUTA2 that, the integration and teaching of IK in secondary schools faces a challenge of people who have acquired formal education. CFGMUTA2 suggested that, those people who have acquired a western education regard cultural values as unimportant and therefore see no value in integrating IK into the curriculum for the purposes of teaching weather and climate.

4.5.1.5 Media and Technology

The community elders indicated that media and technology are a challenge to IK integration and teaching the topic of weather and climate in Geography in secondary schools. CICHIM1 stated:

"*Kwakauye magitare ekarekare aya. Auya magitare ndiwo akanouraye tsika kwavekuzwe zvinodakadza. Kwozouye tea party ndiyo yakauraye tsika. Maradio ndiwo akazouraya zvose. Yasara iri radio zvaive nane pakazouye television ndiyo yakauraya zvose vana havachatevereri, havachabudi mumhatso, havaachatogari pachara. Saka dziidziso yaiita baba pachara hapana wauchapa*" (CICHIM1, 6 March, 2018)

(The introduction of those old guitars destroyed our tradition. These guitars brought excitement to the people. Then came the tea party's era which also contributed significantly to the destruction of culture and tradition. Radios destroyed everything, but the introduction of radios had less effect on culture than that of the television. The introduction of the television destroyed everything such that children no longer listen to their parents. Children no longer come out

from the television room to attend lessons at *padare* (fire place gathering point). As such there is now no way in which parents can educate their children).

The elders believed that the introduction of guitars, tea parties, radios and televisions are a challenge to the integration and teaching of IK in the Geography lessons in secondary schools due to how people spend their time at home. The community elders are of the view that media and technology destroyed indigenous practices in the home environment as children 'no longer come out from the television room to attend lessons at *padare* (fire place gathering point)'. Parents are now unable to get enough time to educate their children.

Family elders (uncles and grandfathers) used to conduct indigenous education for the boys at *padare* whereas education for the girls was conducted *mumba yekubikira* (kitchen) by aunts and grandmothers:

"*Sebanza rino, muno umu ndimo maipiwa nhoroondo yekuvhima, kuteya mhuka---*" (CFGMUTA2, 14 March 2018). (In this *banza* [half wall grass- thatched hut] that is where boys were taught IK and livelihood skills)

"*Vasikana vaipiwa dziidziso yavo mumba yekubikira na vanatete na mbuya*. (CFGCHIM2, 14 March, 2018). (Education for the girls was conducted in the kitchen by the aunts and grandmothers)

CFGCHIM2, CFGMUTA2 and CICHIM1, concurred that, there is now a challenge to indigenous education children used to receive at *banza/padare/chara* (fireplace gathering point) and *imba yekubikira* (kitchen) since nowadays children are spending much of their time on media and technology (guitars, radios, tea parties and television). The elders viewed the indigenous education received at the family gatherings as constituting part of the lessons received in the classroom. The elders' point of view is that, the teaching of IK in Geography lessons should not be restricted to the classroom. The teaching of IK is regarded by elders as a contribution from the community elders as well as from the teachers. The failure by the children to attend community gatherings due to media and technology robs them of indigenous education and it is therefore a challenge to the integration and teaching of IK related to weather and climate in the secondary schools.

4.5.1.6 Government Policies

The community elders were asked their views on the role of government on indigenous education. The community elders revealed that policies on children's rights that have been put in place by the government are a challenge to the integration and teaching of IK on weather and climate in the secondary schools. CFGBUH2 elaborated:

"*Zvinhu zvirikunyanye kutishaishira pakuti mhuri yedu tisasaitonge zvakanaka, mhunhu wandingaise pamberi ihurumende. Ndiye munhu wekutanga hurumende, peyakandotaure kuti mwana haacharohwi yakatishaishira tsika dzedu*" (CFGBUH2, 20 March 2018) (Government policy on children's rights is failing parents to control their children. The government destroyed our indigenous practices on discipline by instituting children's rights that are against beating children as a form of punishment.)

The views from CFGBUH2 were emphasised by CFGMUTA1 as illustrated below:

"Zvimhingamupini zvatirikuona handi hedu kuti tirikushooraba, eeh matongerwe enyika, ukataura nezvechivanhu chedu, pane kamwe kamutauriro kekuti, 'marights angu' aya. Iwe urikutaurira mwana kuti zvaurikuita sandizvoba, unonzwa avakuti, 'marights angu' (All members nodded their heads in agreement) (CFGMUTA1, 14 March 2018)

(The challenges we are facing, without apportioning the blame on politicians, if you talk about IK, they always refer to human rights. You may be trying to educate the child on indigenous education, you hear them saying 'I have got my rights')

"*Zvamunoona vana vachizi tavekuvakorera is through nekuti wakaende kuopiwe freedom yekuzwi mukaona maitirwe chakaipa nababa endai munomangara kumapurisa. Saka how can I teach my child?"* (CIBHU2, 8 March, 2018)

(When you see us parents failing to discipline or control our children it is because the children have been given too much freedom and they can report the parent to the police for any minor indiscipline, so there is no way I can teach my child indigenous practices).

CIBUH2 and CFGMUTA1 concurred that government policies on children's' rights pose a serious challenge to the integration and teaching of IK in the Geography lessons of weather

and climate. The government has promulgated policies on children's' rights that are in contradiction to indigenous education. The elders felt that parents are failing to control their children as a result of child rights that are too protective to the child. The children can report any form of abuse to the police and the parent can be arrested and the parent's attempts to educate his/her children can be taken as abuse- forcing the child to listen. The children always refer to their 'children rights' whenever parents try to educate the child on indigenous practices. The elders perceived children's' human rights as a challenge to IK integration since some of the cultural practices such as working up early in the morning to work in the fields and doing household chores are regarded as abuse if integrated in the Geography curriculum.

The discussion with the community elders unmasked that integrating IK in the teaching of weather and climate is facing some challenges from human rights laws and government policy. The government introduced policies on human rights and the protection of the child. These statutes tend to go against the norms and values of the indigenous people of Manicaland. These norms and values expected from the children by the Manicaland elderly community include waking up in the morning to work in the fields and carrying out domestic chores (thrashing millet, collecting firewood and water, cleaning the home) before the children go to school. The community elders have their own standard of what they value as culture. Parents and the children are seeing culture through different lenses.

This section, on the views by elders concludes that the integration of IK in the teaching of weather and climate has been hampered by modern developments. The introduction of guitars, tea parties, the radio and the television meant that children spent most of their time glued to modern gadgets. These, deprived parents of time to educate their children on indigenous practices. The elders belived that television and radio have also distorted the African culture of *ubuntu* as children are exposed to different cultures on television and radio programmes as well as social media which they imbibe. Consequently, they argued that children have been largely exposed to foreign cultures whereas elderly people believe in their traditions. This brings in the challenge of which aspects of culture should be integrated in the teaching of weather and climate. The next section presents findings from interviews and FGD with teachers.

4.5.2 Pedagogical challenges in IK integration

The theme presents findings from interviews and FGD with teachers that may pose some challenges in the integration of IK in the teaching of the topic on weather and climate in Geography in the secondary schools.

4.5.2.1 Lack of documented indigenous learning resources

The research findings from interviews and focus group discussions have revealed that a lack of documented resources is a major challenge to IKintegration and the teaching of IK in Geography lessons on weather and climate. The MPGI explained the lack of documented resources:

"Most of the information we have on IK is oral. There are not many efficient sources on IK systems on weather and so on. That will be a challenge because when you are to integrate, you must be fully knowledgeable about what you want to teach (MPGI, 12 March, 2018)."

MPGI view is that oral source on IK are an impediment to the integration of IK in the teaching of weather and climate. The challenge is that there are few dependable sources on IK that can be used to teach IK in Geography lessons. Teachers are not fully knowledgeable on what to teach due to the lack of documented sources which they can refer to. Teachers need documented sources to refer to during scheming, planning and preparation of teaching notes.

TIMUTA1 in an interview in Mutasa District echoed the views by MPGI by stating that:

"*The problem with integrating IK is that there is no documentation that we have, the problem is unrecorded information. It lacks consistence, people die with some knowledge before it is passed to the next generation and people not willing to record, as such it lacks coherence of some sort. If my grandmother told my father something before, she dies, the same knowledge impacted by my father to my child Rukudzo she can't say it 100 percent the way it was told by my grandmother"* (TIMUT1, 3 February, 2018).

TIMUTA1 held the view that, the challenge of integrating IK in the teaching of weather and climate is that, IK is linked to the oral tradition of indigenous cultures and it consists of unrecorded information which lacks consistency and coherence. Another challenge cited by the teacher on integrating IK is that, IK is lost during oral transmission from one generation to the other.

TICHIP1 in an interview in Chipinge, believes that the dialect chosen to be used in IK in the textbooks will be a challenge. TICHIP1 explained how differences in the dialects used by different authors can pose a challenge to the successful integration of IK in Geography:

"*Pamatextbooks on IK pacho panogona kusiyana depending neakanyora textbook racho. Text rakanyorwa neMukaranga rinogona kusiya zveChindau"*. (TICHIP1, 6 March, 2018

(The content and interpretation of IK to be introduced in textbooks may vary depending on the author's dialect used in writing the IK section in the textbook. A textbook written in *Karanga* [dialect commonly used by people from Masvingo province] can differ with the one written by a *Ndau* author [dialect commonly used in the south-eastern parts of Zimbabwe].

The teacher perceived that variations in the content of IK in the textbook/s written by authors from different dialect groups could pose as a challenge for teaching, learning and assessment. The teacher was of the view that a textbook with IK content, written for example by a *Karanga* author can differ with the one written by a *Ndau* author on expressing even the same IK aspect. In Zimbabwe there are different local indigenous languages. Different terms meaning the same thing can be used to explain IK concepts on weather and climate. This variation could pose a challenge in learners' understanding of IK t. As an example, a common rain bird used to forecast weather is known by different names such as *haya or dzvotsvotsvo or koriro* in different dialects within the same province of Manicaland.

4.5.2.2 Lack of training by teachers in IK

The study exposed that, some teachers were not prepared to integrate IK in the teaching of weather and climate in Geography lessons in secondary schools because they lacked any form of training in indigenous knowledge. TFGCHIP4 explained the lack of training of teachers in IK as a hindrance to the integration of IK in Geography:

"*We have heard about IK but the challenge is especially that we have not been trained in IK. Teachers need to be trained. Especially myself I am not prepared to teach IK because there is a lot of research, this and that rather than the usual syllabus I am used to. I am not used to change and also looking into our community these days we have few of these Elderly people who cover all the areas.* (TFGCHIP4, 6 March, 2018)

The teacher viewed the lack of training by teachers in IK as a major challenge in integrating and teaching IK in Geography lessons in secondary schools. TFGCHIP4 felt that, integrating IK in Geography lessons would amount to a burden of researching and finding information on IK concepts. The research study established that anything new is resisted and perceived as a challenge. Also, the lack of elderly people who could teach IK concepts and content to the learners in the Geography lessons was regarded as a further challenge to its integration and teaching in Geography.

However, it is important to take note of comments made by the MPGI who gave a counter argument regarding the lack of trained teachers:

"Teachers *are trained during a certain era and they don't expire with the expiring of a syllabus. They should be able to read and understand these things (referring to IK) and teach them*". (MPGI, 12 March 2018).

The MPGI argument exposes that teachers should be able to adapt to changing learning environments. Teachers are not trained to tackle a specific syllabus or concept. Teachers should read and understand new ideas including IK to enhance its integration in the teaching of weather and climate. The Geography inspector therefore does not consider a deficiency in the training of teachers as a hindrance to the integration and teaching of indigenous knowledge.

4.5.2.3 Teachers' prior experiences and background on indigenous practices

The study uncovered that, the negative attitude toward indigenous practices is a challenge to integrating and teaching IK in the section onweather and climate in Geography in secondary schools. Teacher (TFGMUT2) narrated prior experiences on rain making ceremonies in Nyanga as follows:

"It was in 1995 soon after the drought period of 1991 to 1994.The traditional elders came to the school and announced that enrolment was going to be low on a Thursday as they will be holding mukwerere (rain making ceremony). They did that and I was there at the ceremony. They informed us that we were supposed to be near homes or houses as it was going to rain cats and dogs. After the ceremony no rains were experienced over a week from the day of the rainmaking ceremony. From this experience I would personally say these things- I don't think they work anymore; they don't work for me, I don't believe in them (rainmaking ceremonies) (TFGMUT2, 13 February 2018)*"*

Prior experiences on indigenous practices/ceremonies by teachers can be a challenge for them to consider integration of IK and confidently teaching IK in Geography lessons under the topic of weather and climate in the secondary schools. TFGMUT2 had a negative attitude towards *mukwerere* (rainmaking ceremony) after attending a rain making ceremony that failed to yield some rain immediately and it arrived more than a week after the ceremony was performed. The ceremony failed to yield some rain despite the community elders announcing to the teachers some heavy downpours were expected to fall after the rain making ceremony. TFGMUT2 basing his view on the past experience, believed that these rain making ceremonies no longer have any value as they don't work. TFGMUT2 had a negative attitude toward indigenous practices and therefore does not believe in integrating IK in the teaching of weather and climate in the Geography lessons in secondary schools because he is not confident about this knowledge and he does not trust it. It's clear from TFGMUT2 articulations that he sees IK as false knowledge.

TFGMUT1 concurred with TFGMUT2 arguing that:

"*Mr Risiro, because I don't believe in rainmaking ceremonies, so integrating it is a bit shaky, because I don't believe it, but a teacher who believes in it, I think may integrate IK. I say to a lesser extent we can integrate it because most of the things on IK do not work, maybe they use to work that time but doesn't work now"* (TFGMUT1, 13 February, 2018).

TFGMUT1 believed that, it is a challenge to integrate and teach IK in Geography lessons in weather and climate since she also did not believe in indigenous practices such as rain making ceremonies. The teacher (TFGMUT1) does not believe in IK '*because most of the things on IK do not work*' although the teacher does not discount that maybe they used to work in the past. The teacher was of the view that those teachers who believed in indigenous practices may feel confident integrating IK in the teaching of weather and climate.

In an interview in Chipinge, one of the teachers, TICHIP1 expressed the view that, the integration of IK in the teaching of weather and climate depends on particular variables: one's religious inclination and age as well:

"*I think belief in indigenous practices depends with religious inclination as well as your age. If you are from the years gone by, we use to witness that (referring to experiencing some rains after Elders perform mukwerere) long time ago, or those spirit mediums being appeased and thereafter you receive the rain, you believe that. For the person who is a Christian and part of the younger generation, who did not experience rainmaking ceremonies may not particularly agree with integrating IK."* (TICHIP1, 6 March, 2018)

TFGCHIP1 believed that, the elderly teachers who used to witness some rains after their elders performed *mukwerere* (rain making ceremonies) or appeasement of the spirit mediums are more likely to integrate and teach IK in the Geography lessons of weather and climate than the younger generation of teachers. The teacher's view was that those elderly teachers who experienced some rains after the performance of rain making ceremonies are more likely to believe in indigenous practices. Such teachers are bound to integrate IK in the Geography lessons. The young generation of teachers who might not have experienced indigenous practices such as rain making may not believe in integrating IK in their lessons.

4.5.2.4 Urbanisation

The study established from the interview with MPGI that urbanisation is a challenge to the integration and teaching of IK in the Geography lessons in secondary schools. The MPGI said that:

"Urbanisation is a challenge especially for people in urban areas here who are no longer in touch with real African tradition" (MPGI, 12 March, 2018)

The Geography inspector was of the view that, people living in urban areas werea challenge to the integration and teaching of IK in the study of weather and climate in Geography. The Geography inspector believed that the people in urban areas were no longer in touch with '*real African tradition*' as a result both the teachers and the elderly people lacked the knowledge to teach the Geography learners.

The teachers also revealed that, the diversity of cultures in urban areas presents a challenge to the integration of IK in the teaching of weather and climate in the secondary schools. TFGMUT2 explained that:

"*In a classroom set up we have got two cultures, those who have the rural background and those with an urban background. The problem is: whose culture are we going to teach? So, it would be difficult to incorporate those learners and for them to believe one thing."* (TFGMUT2, 13 February, 2018).

TFGMUT2 believed that it was a challenge to have a common ground on IK content to teach to a multicultural class with different ideologies. Students from a rural background have got different culture from those from urban environment. TFGMUT2 found it difficult to incorporate different settlement cultures of learners in the teaching of weather and climate. The challenge is largely due to the idea that learners will bring to the classroom a diversity of norms, values and cultural practices. This makes it difficult for the teacher to reconcile learners with these diversified cultural backgrounds.

It was evident from the findings from teachers that, urbanisation has resulted in a diversity of cultures in the classroom thus presenting a challenge in teaching a multicultural class. Furthermore, it was revealed that, people who stay in urban areas are no longer in touch with African tradition. More so, learners in urban areas are also exposed to different sources of information which may contradict indigenous practices.

4.5.2.5 Assessment Challenges

The findings from teachers' interviews and focus group discussions revealed that, variations in the dialects spoken by people from Manicaland poses a challenge to the integration and teaching of IK in the study of weather and climate in Geography. TFGCHIM2 explained the challenges of learners speaking different dialects on assessment:

"*As we said earlier on (referring to terms used to describe rainmaking ceremonies) other areas may say makoto (rain making ceremony beer) to describe rain making ceremony; others mukwerere (rain making ceremony beer), so we might face challenges in standardizing the examination just like standard Shona, some are Karanga (dialect used in Masvingo), some of us Vanawasu (*people from Mutasa area*), I come from Honde valley"*. (TFGCHIM2, 5 March, 2018).

TFGCHIM2 regarded dialect differences spoken across Manicaland as a challenge during assessment of Geography concepts in secondary schools. TFGCHIM2 observed that, the rain making ceremony is known by different terms in different parts of Manicaland. In some parts

the rain making ceremony is called *makoto* and some refer to the same ceremony as *mukwerere*. This is so because some speak *Kalanga* where as some are *vana Wasu* who speak *Manyika* dialect. The variations were viewed by the teacher as a challenge during assessment of weather and climate in Geography.

The view by TFGCHIM2 on the terminology used to refer to the rain making ceremony was echoed by other participants in other parts of Manicaland. The term *makoto* was mentioned by TFGCHIM2 in the eastern part of Chimanimani. In the western part of Chimanimani TFGCHIM1 and CFGCHIM1 explained that, they use the term *zvitsanza* to describe the rain making ceremony. In Chipinge, CFGCHIP4, the rain making ceremony is referred to as *doro remutere*.

It was evident from the interviews and FGD with both teachers TFGCHIM2 and TFGCHIM1 and community elders, CFGCHIM1 and CFGCHIP4 that, variations in dialects used to describe the same aspect of weather poses a challenge to the markers who may not be familiar with the dialect used by the learner. Learners might use terms of which the teacher is not be familiar with.

In addition, the research established that, geographic variations of IK were a challenge to integrating IK in the teaching of weather and climate in the secondary schools:

"*May be on assessment, if it is summative assessment, this IK differ from one area to another. May be the things we are doing here in Manicaland, they are not the same things that are done in Matabelaland, so when it comes to summative assessment it becomes a problem".* (TFGBHU3, 9 March, 2018).

TFGBHU3 perceives the geographical variations on the nature of IK as a challenge to the teaching of IK in weather and climate studies. The teacher observed that IK differed from one area to another. Indigenous practices in Manicaland vary from those practiced in Matabeleland. This poses a challenge during summative assessment of weather and climate in the secondary schools since indigenous practices are not similar across all regions in Zimbabwe.

It was apparent from the teacher, TFGBHU3 that, IK is geographic specific. The indigenous practices and terminology in each area varies also with the geographical area. This poses a challenge during assessment of weather and climate in Geography in the secondary schools.

4.5.3 Part 4 Summary

Part 4 presented challenges of integrating IK in the teaching of weather and climate. The responses from community elders were presented separately from those from teachers. Research findings from the community elders revealed that Missionary activities discouraged African tradition that are associated with beer for rain making ceremonies as they are regarded as evil. This has become a challenge in the integration and teaching of IK in Geography lessons. It emerged that, formal employment and education has resulted in the breakdown of extended families. This has limited the role played by community elders in teaching children indigenous knowledge. The government has also instituted various laws that protect the child from abuse. However, community elders felt that, these laws on children's rights have overprotected the child resulting in indiscipline and loss of indigenous practices. The community elders advocate for *ubuntu* values in the education system. Children thought western culture as modernity whereas elders view western culture as indiscipline and disrespect for indigenous practices. The different world views between children and community elders provide a rough terrain for the integration of IK into the teaching of IK in secondary school Geography. There is a dilemma on what constitutes knowledge for integration and teaching in the study of weather and climate.

It emerged from teachers' responses that the lack of documented resources and training of teachers in IK is a challenge in integrating IK in the teaching of weather and climate. There is scarcity of Zimbabwean text books on IK for use in the schools. This makes it difficult for the teachers to scheme, plan or prepare notes for teaching IK in the Geography lessons on weather and climate. Teachers therefore, proposed the team writing of IK text books so that information from authors with diverse backgrounds can enrich IK content in schools. Staff development workshops were proposed as a mechanism for equipping teachers with content and IK methodologies related to the teaching of weather and climate. The attitudes and belief systems of teachers are yet another hindrance to IK integration. Some teachers due to their religious beliefs and experience do not believe in indigenous tradition. They are therefore not prepared to teach IK in secondary schools. On the other hand, some of the teachers believe that IK has been replaced by modernization and Christianity. The teachers felt that some church run schools influence content that is taught in their schools thus posing a challenge of integrating IK in the Geography curriculum. Variations in IK and dialects used in Manicaland province are a challenge to markers and learners in the summative examinations.

4.6 Conclusion

Chapter 4 presented the codes used in identifying the participants. The codes utilized were able to link the participant, instrument used to collect data and the district where the data were collected. The characteristics of the participants such as gender were also discussed.

It was emerged that, the decolonisation of the Geography curriculum and the integration of IK in the teaching of weather and climate promotes Zimbabwean national heritage. It was established that the integration of IK in Geography lessons can improve teaching practices. Teaching becomes more interesting and it contributes to a generation of new ideas. It was also reported that integration of IK in Geography lessons promotes community engagement. The integration of IK promotes the use of participatory approaches to teaching and learning such as field work.

The study observed that IK can feature in the teaching of weather and climate in various ways. A pedagogical debate ensued in the focus groups wherein teachers proposed various ways in which they can integrate IK in the teaching of weather and climate in Geography in secondary schools. It was established that IK can be integrated and feature in Geography lessons as an introduction to the lesson; as infused with WS; as selected IK concepts or it can be taught as a module.

The research further exposed that, IK can feature in the teaching of weather and climate in the form of local language usage to describe and explain meteorological concepts in Geography. It was revealed that local people of Manicaland have rich indigenous terminology to describe atmospheric phenomena and processes such as air masses, clouds, precipitation forms and seasons which can feature in the studies of weather and climate. Further the study exposed that IK can feature in the teaching of weather and climate as cultural practices and experiences. This can be unpacked in the form of various indigenous methods of predicting weather. These include indigenous biological methods such as use of plant morphological changes and the presence and behavior of birds, insects and animals. It was also revealed that features such as the moon/sun, cloud types and direction of air movement are used in weather forecasting by the local people and these can therefore feature in the study of weather and climate. Rain making ceremonies were found to be the foundation and backbone of the cultural practices in rain formation. The elders believed that their ancestors can interact with them through rain

making ceremonies. The appeased ancestors would in turn provide the community with a fruitful rain seasons free of environmental hazards.

Despite the above, the last part of chapter 4 presented the findings on the challenges of integrating IK in the teaching of weather and climate in the secondary schools. The community elders revealed that Missionary activities discouraged African traditions associated with beer for rain making ceremonies as these were regarded as evil. It was established that western education, formal employment, urbanisation and technological developments were some of the challenges that limited the role played by community elders in educating the children indigenous education. The elders strongly believed that the Government of Zimbabwe has overprotected the child resulting in indiscipline and loss of indigenous practices. The elders advocate for *ubuntu* values in the education system.

The study established from the teachers that, lack of documented resources and training of teachers in IK was a challenge in integrating IK in the teaching of weather and climate. There is scarcity of Zimbabwean text books on IK for use in the schools. The teachers did propose team writing of IK text books so that information from diverse backgrounds of authors can enrich IK content in the schools. Staff development was proposed to equip the teachers with content and IK methodologies. Negative attitudes and religious beliefs were viewed by the teachers as some of the impediments to IK integration. Some teachers, due to their religious beliefs and negative attitude toward indigenous traditions were not prepared to teach IK on weather and climate in the secondary schools. The teachers felt that some of the schools run by religious organizations prescribe the content to be taught in their schools thus posing a challenge of integrating IK in the Geography curriculum. Due to variations in dialects in Manicaland, the assessment of IK in the summative examinations in terms of the marking was viewed by teachers as a prospective challenge as well as for learners studying for an assessment.

CHAPTER 5: DISCUSSION OF FINDINGS

5.1 Introduction

The previous chapter 4 presented the findings from the study. The findings were presented according to the three research questions. Chapter 5 discussed the findings presented in chapter 4 in relation to the literature review given in chapter 2. The findings were discussed in relation to the three research questions. Part 1 of chapter 5 discussed the codes utilized in the study and research participants. Part 2 focused on the discussion of findings addressing research question one (1) which relates to the views of teachers and community elders on the decolonisation and integration of IK in the teaching of weather and climate in Geography in the secondary schools. Part 3 of the study discussed the findings of how IK can feature in the teaching of weather and climate in Geography in the secondary schools (research question 2). Finally, part 4 is a discussion of the challenges of integrating IK in the teaching of weather and climate in Geography in the secondary schools (research question 3).

5.2 PART 1: CODES USED IN THE STUDY AND RESEARCH PARTICIPANTS

5.2.1 Codes utilized in the study

Codes were used in the study in order to identify the participants in the research. The coding system used was important in that data can be traced to the participant who made the contribution. The use of codes was to ensure the anonymity and confidentiality of the participant. This was in line with Cohen, Manion & Morrison (2011) who indicated that information collected can be made accessible to the public without revealing the source of the information. Similar coding system that traces data to the source was found useful by Tarisayi (2017) in the study of land reform beneficiaries in Zimbabwe and Mashoko (2018) in his study on food preservation in science teaching in Chivi district, Masvingo province.

5.2.2 Participants in the research

The section discusses the characteristics of the participants who were involved in the study.

5.2.2.1 Teachers' interviews

There were more male participants (62%) than females (37.5%) [refer to table 4.5]. There is still gender bias in Zimbabwe as a result of the inherited British education system and cultural

factors which tended to discriminate the girl child in accessing education (Zindi, 1996). This resulted in few female practicing Geography teachers hence the gender bias in the sample.

5.2.2.2 Community elders' interviews

Table 4.6 shows more male participants (57.1%) than females (42.9%) in the interviews. Traditionally in Zimbabwe, village heads are dominated by males (Tarisayi, 2017). The male village heads often referred to their male counterparts for the interviews. The researcher approached the village heads (leaders) in order to access the participants since village heads are the custodians of cultural practices.

5.2.2.3 Teachers' focus group participants

A total of 32 participants took part in the focus group discussions. Females constituted 40.6% of the participants in the teachers' focus group discussion. The male participants (59.4%) made up the bulk of the participants (refer to table 4.7). Traditional and religious factors led to parents offering an opportunity to the male child to attend school (Zindi, 1996). Some parents think that it is a loss to educate the girl child who is going to be married and leave her parents (Zindi, 1996). This explains the dominance of male teacher participants as well in the focus group discussions.

5.2.2.4 Community elders focus group participants

A total of 27 Community elders participated in the focus group discussions, with an average of four members making the focus group. Patton (2002) observed that a small number of carefully selected cases can generate a lot of information. Vandeleur (2010, p.103) in studying the inclusion of indigenous technology in C2005 in South Africa observed that "focus groups with 4 to 6 participants generated meaningful discussions".

Of particular interest is Chipinge and Mutasa district. In Chipinge the village head was a woman and recommended other elderly woman to take part in the focus group discussion. The invited women were those who assisted her in handling community courts. This may explain why there were more female participants. In Mutasa district, the dominance of males can be explained by the fact that the Headman gave an appointment day for the interviews when he was holding a communal court. The Headman had invited his assistants to be part of the focus group. He is assisted by male 'lieutenants' during the communal court hearings. The concept

of participants recommending others to be involved in the study is in agreement with Patton's (2002) idea of snowballing.

5.3 PART 2: VIEWS ON THE DECOLONISATION AND INTEGRATION OF IK IN THE TEACHING OF WEATHER AND CLIMATE IN GEOGRAPHY

The community and pedagogical perspectives are discussed in this section. The community perspective discusses the views of the community elders. A pedagogical perspective by including analysis of the teachers' views on the decolonisation of the Geography curriculum and the integration of IK in the teaching of weather and climate in the secondary schools was invaluable.

5.3.1 Community Perspective on IK integration in Geography

The views of the community elders on the decolonisation of the Geography curriculum and the integration of IK in the teaching of weather and climate in Geography in the secondary schools was significant in revealing whether they would support advocating for curriculum enhancement through IK inclusion in the syllabus.

5.3.1.1 Restoration of national identity

The community viewed the integration and decolonisation of the curriculum as one way of reclaiming Zimbabwean national identity. In a study on IK integration in South Africa, Seehawer (2018) observed that, integrating IK in the school curriculum was a way of decolonizing and Africanising the education system. The community in this current study was positive that integrating IK in the teaching of Geography enables the learners to know that, they are people; they are Africans who are identified by their national identity. The elders' perspective was that, Zimbabwe's national identity was built upon *unhu/ubuntu* values within the society. The community viewed indigenous education as something that develops a child to a whole being. IK was therefore regarded as holistic in nature as viewed by Darko (2014); Mahlatsi (2017) and Oviawe (2016). The community perspective implied that the teaching of IK should not only be centered on weather and climate. It is supposed to be broader and more holistic thus covering concepts including national identity, local language use and indigenous practices such as ceremonies and indigenous ways of weather forecasting. The views by the

elders is in line with the theoretical frameworks of post colonial theory that fights the dominace of the Eurocentric voice. The community elders are viewing the integration of IK in the teaching of IK in Geography as a way of reclaiming national identity, a view supported by post-colonialists.

Furthemore, the view by the community that IK teaching in schools should incorporate *unhu/ubuntu* values is in agreement with Nziramasanga Commission of Inquiry into Education which was carried out in1999 in Zimbabwe (Government of Zimbabwe, 1999). This commission was established to assess the state of education in Zimbabwe by the then President, Robert Mugabe. In its findings the commission noted that students' delinquency was contributed by an education system that lacked *ubuntu* values such as respect, sharing and love for one another (Government of Zimbabwe, 1999).

The community thrust to promote national identity amongst the learners in the secondary schools is also in line with the Ministry of Primary and Secondary Education Curriculum Framework For Primary and Secondary Education (MPSECF, 2015-2020).The curriculum framework, in one of its aims (item 1.6.1) states that "The new curriculum is to promote and cherish the Zimbabwean identity in particular patriotism, awareness of heritage, history and traditions and *ubuntu*" (Government of Zimbabwe, 2015, p. 6).The views by the community correlates with Zimbabwean government to promote national identity through the education system. Most African governments soon after attaining their independence from the colonisers felt they should redress the issue of reclaiming national identity through education. Elsewhere in Africa, Julius Nyerere of Tanzania introduced the Ujamaa concept that aimed at reclaiming national identity, equality and human dignity (Mhlauli, 2012). Similarly, the introduction of curriculum 2005 by the South African Government, among other aims was introduced into the education system in order to redress apartheid injustices (Vhurumuka & Mokeleche, 2009).

In concurrence with the community perspective, Shizha (2014, p. 1871) further advocated for the African child to "learn their own cultures, history and traditions before they learn other cultures". Further, Castagno and Braboy (2008) was of the view that the understating of one's national identity and local traditions improves comprehension and performance of the learners. It is evident from the community perspectives that, integrating IK in the teaching of weather

and climate in secondary schools in Zimbabwe is a means of decolonising the Geography curriculum and regaining what is perceived to be a lost national identity.

5.3.1.2 Restoration of cultural values

The community also viewed the decolonisation of the Geography curriculum and the integration of IK in the teaching of weather and climate in the secondary schools as a pathway to restore Zimbabwean cultural values which had been eroded over time with a westernized education. Studies carried out by Mawere (2015) in public education in Sub-Saharan Africa and by Seehawer (2018) on IK integration in South Africa has shown that, integrating IK in the school curricula connects learners with their culture and bringing back the role of the community in educating children. The Manicaland community thought that, IK integration in weather and climate would bring back the role of elders to teach indigenous values to the children. The view by the community elders is in agreement with Govender, et al's., (2016) study with preservice teachers who observed that, IK integration provides an opportunity to promote the interaction of the community with the learners and teachers.

Mapara (2009) in his studies of IK among the Tangwena people in Zimbabwe observed that, elders taught survival skills, cultural values and gender roles to the children. Traditionally in Zimbabwe indigenous education for the girl child was conducted by the aunts and grandmothers and that of the boys were facilitated by uncles and grandfathers (Mapara, 2009). The boys held their indigenous education at *pabaza/ padare/pachara* (fire place) in the evening. The boys were taught livelihood skills such as farming and hunting as well as looking after the family. The girls on the other hand received indigenous education on how to perform domestic and motherhood roles.

The study further established that, Manicaland community believed in indigenous education which makes a child a total human being with both academic and *unhu/ubuntu* values. The philosophy suggests that an individual is a person because of other people (Odora-Hoppers, 2017) which is a strong African unhu/ubuntu principle. The community perceived a graduate from the secondary schools as someone who would have acquired *ubuntu* values apart from attaining broad content knowledge in Geography.

The elders further bemoaned the loss of culture and traditions as they were exposed to people adopting foreign cultures. The elders blamed the erratic rainfall patterns to a lack of adherence

to the practice of rain making ceremonies. The worry by elders on failure by the younger generation to follow procedures in brewing the beer is because beer for rain making is a way of communicating with the ancestors in their request for rains and a fruitful season. This ceremony is also practiced in Thailand and Malawi (Arunotai, 2006) in which beer was poured into the ground to appease the ancestral spirits so that in turn they would offer a fruitful rainy season and protection from environmental hazards. Iseke and Desmoulins (2015) reported on elders who underscored the role of spirituality in IK knowledge production.

Shizha (2014) concurs with the views of the community elders on teaching cultural values to the children by advocating for African children to learn their own indigenous culture before learning a foreign culture. The United Nations Declaration on the Rights on Indigenous People [UNDRIP] in 2007 supported the inclusion of IK in the school curriculum. Article 31-1 articulates the rights by indigenous people to pass on to the future generations their traditions, history, language and philosophy. Article 14-1 of the UNDRIP further gave legal power to the indigenous people to have a stake in the establishment of educational institutions which meet the expectations of the local culture (United Nations, 2007).

5.3.2 Pedagogical perspectives on IK integration in Geography

In this section, the teachers' views on the decolonisation of the Geography curriculum and the integration of IK in the teaching of weather and climate in the secondary schools are discussed.

5.3.2.1 IK Integration contributes to understanding and a construction of ideas

MPGI views were that, decolonising the Geography curriculum and integrating IK in the teaching of weather and climate in secondary schools improves the learners' understanding of concepts and construction of new ideas.

MPGI emphasised the link on what is learnt in the classroom and the knowledge brought to the classroom by the learners. The integration of the learner's background and experiences in the teaching of weather and climate would help the learner to develop conceptual frameworks leading to the understanding of concepts. Ndlovu (2019) in a study of IK at an agricultural college in Zimbabwe observed that, learners brought their experiences to the classroom which should be utilized in the classroom context. Further, Khupe (2014) in studies carried out in Mqatsheni found that, making use of IK in science teaching could contribute to understanding

of science. The MPGI noted that, if the knowledge brought to the classroom by the learner is ignored by the teacher, the learner may get confused due to the lack of linkage in knowledge acquired at home and the new knowledge received in the Geography class. On the other hand, if the knowledge and experiences by the learner are taken onboard by the teacher, learning and understanding of concepts improves. These views concurred with a study carried by Mawere (2015) on public education in Sub-Saharan Africa.

The understanding of Geography concepts and the construction of new ideas is enhanced by linking the learners' background and experiences with subject content taught in the classroom (Dreyer, 2018; Ndlovu, 2019). The study concurs with Mmola's (2010) studies carried out at North West University which revealed that students' performance improved as the teachers linked school and home experience in their teaching.

The teachers believed that learners particularly in the rural societies of Manicaland have knowledge that their elders carry out rain making ceremonies (*mukwerere/musoso/zvitsanza)* for rainfall to take place. The teachers believed that this knowledge should be includedwhen teaching rainfall formation in the Geography lessons on rain formation. Nakata (2003) justifies the integration of IK into the school curriculum by arguing that it contributes to the generation of new knowledge and the creation of an inclusive curriculum. The current Geography syllabus in Zimbabwe has a Eurocentric bias which tends to ignore this knowledge brought in by the learner as such the teaching and understanding of concepts on weather and climate tend to be difficult to understand.

TICHIP2 and TFGMUT2 concurred that, the integration of IK allows for the teaching of meteorological concepts from the known to the unknown, thereby promoting an understanding of new ideas. The teachers believed that the integration of IK allowed learners to give examples from their community. Dreyer (2018) publishing on IK in SA found that authentic teaching and learning of Geography should include using local examples and surroundings by the Geography teacher. In addition, Mawere (2015) noted that, integrating IK and teaching from the known to the unknown enhances an understanding of concepts. These research studies further corroborate with the findings revealed by Castagno & Braboy (2008) who submitted that indigenous education improves the comprehension of concepts and the academic performance by the learners.

The views by MPGI; TICHIP2 and TFGMUT2 that, the integration of IK in the teaching of weather and climate promotes understanding of meteorological concepts and construction of new ideas are in agreement with social constructivism as propounded by Lev Vygostky (1978) presented in the theoretical framework. Social constructivists believe learners can construct knowledge as they interact with their environment which includeselders in the community (Mcleod, 2014). IK can be used to scaffold learning with teachers honing in on the zone of proximal development to promote understanding. Researchers (Khupe, 2014; Castagno & Braboy, 2008) noted that learners' prior knowledge should be made use of to enhance the comprehension of concepts by the learners.

5.3.2.2 Teaching becomes more interesting

The study revealed that the decolonisation of the Geography curriculum and the integration of IK makes the teaching of weather and climate in the secondary schools more interesting. TIMAK2, TICHIP1 and TFGMUT2 concurred that, the use of local examples motivates the students to learn and it makes the lessons more interesting. Tsindoli (2019) in a study of IK integration in Mathematics in Kenya, found that integrating IK in teaching arouses the interest of the learners. Further, Manzini (2006) observed that, the integration of IK in teaching increased excitement and participation amongst the students. Similarly, Hewson and Ogunniyi (2011) observed that the integration of IK in teaching had increased interest in learners. The learners became more resourceful since they were able to give examples from their community. The views by the teachers suggested that, the integration of IK in the teaching of Geography allowed the learners to contribute to the knowledge.

Further, TFGMUT4 was of the view that, the integration of IK in the teaching of weather and climate becomes interesting since it allows learners to 'see and experience' what they are taught in the classroom. Dreyer (2018) observed that authentic teaching of Geography should entail outdoor activities where the learners acquire knowledge through observation and practical activities. In support of outdoor activities, Shizha (2014) in a study carried out in the sciences observed that the integration of IK in the teaching of science improves interaction. The learners would have first hand information as they interact with the physical and human environment (Shizha, 2014). The integration of IK in teaching of Geography therefore promotes discovery learning through seeing and experiencing. The learners would get interested when they discover on their own new information from their community. Ogunniyi and Ogawa (2008)

recommended that, IK integration in teaching should include learners going out on field work in the natural settings. Learners can go out into the natural environment and research indigenous ways of weather forecasting.

5.3.2.3 Integration of IK promotes community engagement and learner centered approaches

Teachers perceived that, the decolonisation of the Geography curriculum and the integration of IK in the teaching of weather and climate promoted community engagement and learner centered approaches as learners interact with the community in research on IK related to weather and climate. Ndlovu (2019) observed that IK could be studied by learners researching or having work-related learning within the community. The community could be engaged and can participate in the learning process of their children. Ngcoza (2018) reported on a Xhosa elder who came as guest teacher at Rhodes University to teach students how to brew traditional beer, *umqomboti*. Similarly, Dennis (2010) observed that indigenous education promoted field experiences by the students and an invitation of elders to participate in contact lessons in the classroom.

The research findings resonated well with Hewson (2012) in the studies carried out in Lesotho. It was observed that the community wanted field work to be carried out as part of teaching in the schools. The research carried out by Dennis (2010) in the Canadian schools complements the study findings. Dennis (2010, p.35) proclaimed that the Aboriginal education was buttressed through "field experiences and use of community elders" who explained to the learners the Aboriginal history and traditions. The teachers in this current study believed that the integration of IK would promote research amongst the learners. Mahlatsi (2017) observed that, the integration of IK in teaching allowed all educational stakeholders to contribute to knowledge. The learners can generate research materials by engaging the community in research on IK related to weather and climate. Carter (2006) and Mawere (2015) acknowledged that the integration and teaching of IK contributes to new knowledge being revealed.

5.3.3 Part 2 Summary

The ongoing discussions concluded that the integration of IK in the teaching of weather and climate reclaims the Zimbabwean national identity and cultural values. The integration of IK in the teaching of weather and climate in the secondary schools improves the understanding of Geographical concepts, creation of new knowledge and makes teaching more interesting and

learner-centered. Integration of IK in the teaching of Geography lessons promotes community engagement. The learners and the community are engaged in the sharing and in the acquisition of knowledge related to weather and climate.

5.4 PART 3 HOW IK CAN FEATURE IN THE TEACHING OF WEATHER AND CLIMATE IN GEOGRAPHY

The previous part 2 discussed the findings on the views of elders and teachers on the decolonisation and integration of IK in the teaching of the topic on weather and climate in Geography in the secondary schools. This section discusses the findings of research question 2 on how indigenous knowledge can feature in the teaching of the topic on weather and climate in the secondary schools.

5.4.1 Theory construction: Pathways for IK integration into the Geography curriculum

The section discusses findings from the teachers on how they believed IK could feature in the teaching of the topic on weather and climate in Geography in secondary schools as well as constructing theory on pathways for IK integration. The teachers discussed various pathways in which IK could feature in the teaching of weather and climate in Geography in secondary schools (Figure 5.1).

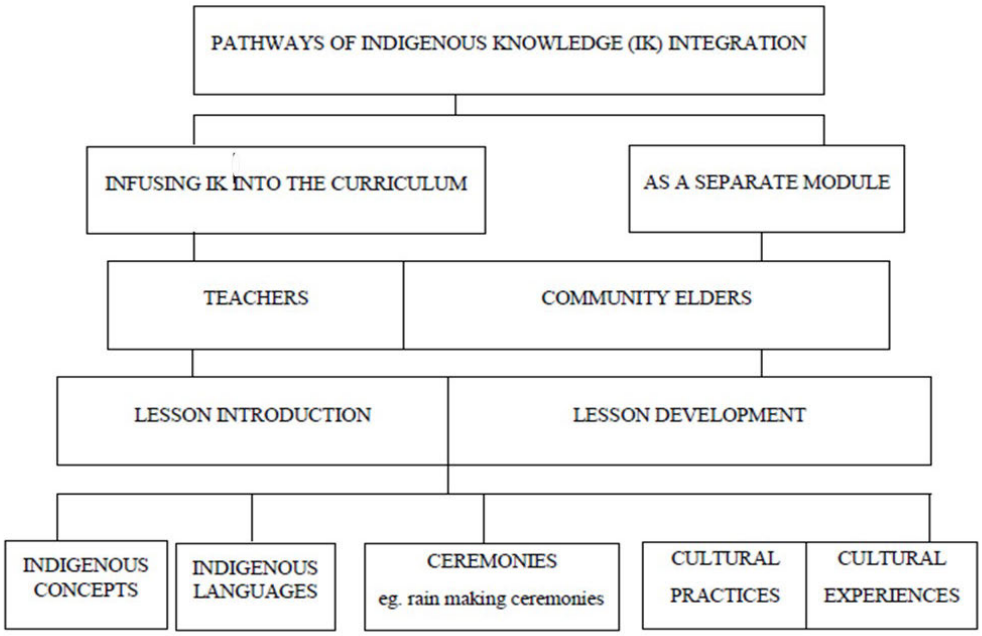

Figure 5.1 Pathways of integrating IK in Geography (Field data, 2018)

Figure 5.1 shows that there are many ways in terms of the pathways of integrating IK into Geography curriculum. The first pathway is that, IK can be infused directly into the Geography curriculum or it can be infused as a separate module. If it is infused directly into the Geography curriculum or as a separate module, both can be taught by teachers or community elders. Thereafter, whether the teachers and the community elders are teaching it, IK can be infused in the lesson introduction or and it can also be infused in the lesson development. In either the lesson introduction or lesson development, the following content could be infused in the teaching of Geography: the use of indigenous concepts; indigenous language; ceremonies and cultural practices and experiences. The pathways in which IK can be integrated into the Geography syllabus are further discussed below:

5.4.1.1 Infusion in lessons: IK with WS

TIMUTA1 and TFGCHIM2 in an interview and focus group discussion respectively, believed that, the integration of IK can feature in the teaching of weather and climate through an infusion of common aspects of IK and WS. For example, TIMUTA1 explained that, in the study of thunderstorms and rain formation there are two areas of commonality between indigenous and WS which can be integrated and taught together. TIMUTA1 argued that, both world views (indigenous and western) have an appreciation of the causes of thunderstorms and the precautionary measures which they take against thunderstorms. Secondly the indigenous people practice what is called *kupisa mavivi* (burning branches of trees) when preparing their fields. The western world view regards the burning of tree branches (*kupisa mavivi*) as a cause for the formation of condensation nuclei in the atmosphere. The two world views have common ground which can be infused into lessons and feature in the teaching of rain formation and thunderstorms in the secondary schools. In a study of IK integration at an agricultural college in Zimbabwe, Ndlovu (2019) found that blending of IK with WS could be used as a strategy of integrating IK in the syllabus. A similar study of IK integration in primary and secondary schools in South Africa among science teachers by Seehawer (2018) found that, the science teachers preferred blending of IK and WS in integrating IK in the science syllabus. Zeremarian (2018) used the term hybridization of IK and WS in place of blending the two forms of knowledge. Naidoo andVithal (2014) regarded this approach of infusing common aspects of the two forms of knowledge as an integrationist approach. This study advocates for integrationist approach as proposed by Naidoo and Vithal (2014) since IK and WS have some common aspects they can share in the study of weather and climate. The current study revealed

that IK and WS have common concepts in areas such as rain formation, cloud types, airmasses and weather forecasting which can be taught together. Further, the integrationist approach acknowledges IK and WS as equal. TIMUTA1 and TFGCHIM2's views are in line with that of Stephens (2000) who established that a common ground for IK and WS could be used as a basis for IK integration in the education system.

The concept of infusing IK and WS has been further supported by a FGD in Chipinge district, TFGCHIP. The teachers were of the view that the IK of weather forecasting can be taught concurrently with WS on weather forecasting. They argue that, the two forms of weather forecasting can complement each other in producing more comprehensive and accurate forecasts (CFGCHIP1). IK and WS have been used together in forecasting weather. In Western Kenya, the Nganyi family provide indigenous weather forecast that is combined with forecasts from Kenyan Meteorological Department (Thomson Reuters Foundation, 2012). In Australia the Government makes use of indigenous methods of weather forecasting to cater for different microclimates (Bureau of Meteorology, 2010). Further, The United Nations Declaration on the Rights on Indigenous People [UNDRIP](United Nations, 2007) further gave a green light and institutional support for the integration of IK in the school curriculum. Article 31-1 of the UNDRIP, articulates the rights by indigenous people to pass on to their future generations their tradition and philosophy. Article 14-1 of the same UNDRIP further gave legal power to the indigenous people to have a stake in the establishment of educational institutions which meet the expectations of their culture and language.

5.4.1.2 IK can feature as a separate module

In a FGD, TFGBUH7 and TFGBUH1 concurred that, IK can feature as a research project in a specific area or as a separate module in school. The teachers believed that IK is geographic specific hence it varies with where the learners come from. The teachers therefore suggested that learners carry out projects on IK relevant to their areas. This approach may mean learners can choose aspects of IK they want to research on in a given area of their interests

TFGBUH7 and TFGBUH1 acknowledged the importance and relevance of IK but they did not want to interfere with the existing syllabus. The two teachers do not believe that the two forms of knowledge are equal. They believe WS should not be interfered with IK. This was revealed

when TFGCHIP1 was asked on how to teach rainmaking ceremonies (*mukwerere*) practiced by the indigenous people together with the WS explanation on rain formation. The teacher was clear that the two forms of knowledge on rain formation cannot be taught together. For TFGCHIP1, there was no linkage between indigenous and WS. The teacher acknowledged that, IK and WS explanation on rain formation should be taught separately as parallels.

Yishak and Gumbo (2014) in a study of indigenising the curricula in Ethiopia, recommended the teaching of IK as a standalone module arguing that IK needs to be well developed before it is integrated with WS. The argument by Yishak and Gumbo (2014) suggest that IK is not equal to WS. The research findings concur with Naidoo and Vithal (2014) who acknowledged the forms of knowledge but suggested that they can be taught as separate entities. Msila (2009) also suggested that IK can be taught separately. The teaching of IK as a separate module has been experienced elsewhere especially in the institutions of higher learning. Mmola (2010) reported that, undergraduate and post graduate programmes introduced IKS at North West University. The University of KwaZulu-Natal has introduced programmes on IKS as well as enrolling doctoral and masters' students who research on IKS (Mubangizi & Kaya, 2015). In a study of IK at an agricultural college in Zimbabwe, Ndlovu (2019) found that, IK could be taught also as a separate module in order to study IK in greater depth. It is therefore possible to teach IK as a separate module or even as a project as evidenced from these three institutions.

5.4.1.4 Integrating IK as an Introduction

In a FGD, TFGMAK3 and TFGCHIP5 argued that, IK can feature in the teaching of weather and climate as an introduction in lessons through the use of traditional songs related to weather and climate elements such as those which relate to clouds and temperature. The teachers suggested that indigenous songs are used to develop the lesson from simple to complex. Mawere (2015) suggest that IK could be integrated into the lesson to introduce more complex concepts (teaching from known to unknown). According to Mawere, learners have prior experiences (known content) which could be taught first in the initial phases of the lesson before introducing new content (unknown)

Mapara (2009, p.145) in his studies of IK in Zimbabwe observed that indigenous "songs, folktales and riddles" were part of indigenous education as the elders teach children some

cultural practices. Mosweunyane (2013) also acknowledged that IK was taught with the aid of songs, riddles and stories. The use of traditional songs in the lesson introduction motivates and creates interest among the learners. The teachers believed that, the prior knowledge the learners have from their home background could feature in the introduction (which is a short period in terms of lesson time) as a link of the learner's prior experiences to the new lesson. The teachers could not envisage the teaching of IK in their lesson development and conclusion of the lesson (which would take greater time in a lesson).

5.4.1.5 IK can feature in form of selected IK concepts

The findings from teachers' FGD in Mutare district, revealed that selected aspects of IK related to weather and climate can feature in the Geography lessons in secondary schools. The teachers' view on what IK is to be integrated was that of selection. The teachers suggested that only appropriate indigenous content, teaching strategies and assessment are to be selected in the teaching of weather and climate. Dreyer (2018) suggested that, the Geography curriculum could be indigenised through selecting appropriate examples from the local environment or within the African continent. In this study of weather and climate, the Geography teacher could select examples such as indigenous terms used to describe clouds, airmasses and rainfall types. Further, Dreyer (2018) suggested that teachers could integrate IK in the Geography syllabus through a selection of appropriate indigenous teaching methods such as outdoor activities that he was advocating for participatory approaches such as fielwork.

The selection of IK concepts for integration into different subjects has been explored by various researchers. Shava (2000) selected food plants for integration with WS; Hewson, Java & Holtman (2009) selected plant healing as content that could be integrated with WS and Mashoko (2018) studied the integration of IK and WS food preservation in the teaching of Sciences in Zimbabwe. The approach of selecting appropriate IK concepts to teach resonates well with Naidoo and Vithal (2014) who viewed this as incorporation approach. Incorporation, suggests that selected and appropriate IK practices can be included and taught in the Geography lessons on weather and climate in secondary schools.

5.4.1.1 IK can feature through community engagement

The MPCDO was of the view that IK can feature in the teaching of weather and climate in secondary schools through engagement of community elders who would teach IK practices related to weather and climate in the Geography lessons.

The MPCDO strongly recommended elders to guest teach in the classroom because of their experience in IK and the cultural values they have acquired. It is interesting to note that MPCDO recognised experience as acquired knowledge. This 'experiential knowledge' by the elders can be equated to qualifications obtained in institutions of higher learning. TFGMAK5 supported MPCDO by acknowledging that some teachers may not be aware of IK concepts and can therefore invite resource persons to teach in the classroom. At Rhodes University elders were invited as guest teachers to teach preparation of a local beer (Ngcoza, 2018). TFGMAK4 supports the invitation of resource persons to teach in the classroom by arguing that this would develop a strong relationship between teachers and the community.

The study correlates with the findings in a Western Canadian study by Graham & Ireland (2008), in which teachers invited community elders into their lessons as resource persons. The elders in Western Canada were invited to teach history and the language of the indigenous people. In a similar study, Dennis (2010) observed that, in the Canadian schools, the students and their parents participated in the local traditions. The Aboriginal teachers taught their students local traditions that included practical work such as drum making, aboriginal dances and painting (Dennis, 2010). Further, elders were invited at the school and at cultural camps to teach Aboriginal spirituality, traditional ceremonies, family history and indigenous languages. Teaching indigenous languages was viewed as one way of integrating IK into the school curriculum (Dennis, 2010). Indigenous experts have been found to key in the teaching of IK in schools. Seehawer (2018), in a study with science teachers in South Africa found that Science teachers invited indigenous experts to teach IK in the schools. A study by Ndlovu (2019) at an agricultural college in Zimbabwe, observed that, lectures and students believed that they would learn more IK practices from the community.

Further, Mapara (2009, p. 145) observed the Tangwena people in which the uncles and aunts conducted indigenous education at "*padare* for the boys and at *pamapfiwa* for the girls".

Several researchers (Hewson, Javu & Holtman, 2009; Khupe, 2014; Webb, 2013) have reported situations in which community elders have been involved in offering their expert cultural knowledge to the teachers and learners.

Teachers also revealed in the present study that IK can feature in the teaching of weather and climate as research materials on IK. Students' research using their parents or knowledgeable others from which research materials on IK can be generated. The views by the teachers are in line with Ogunniyi and Ogawa (2008) who observed that IK should involve field work in the surroundings. This implies that indigenous education is not confined to the classroom. It should involve fieldwork activities by both the teachers and the learners in order to acquire more knowledge from the physical and human environment. In most rural areas in Manicaland, there are elders who the children can access for their research on some tasks on IK related to weather and climate for example indigenous ways of weather forecasting. The challenge is however that the elders are becoming fewer in number particularly in urban areas, as the elderly population often retires to rural areas. In Kenya, Tsindoli (2019), found that integrating IK concepts in Mathematics was facing a challenge emanating from the shortage of elders who are experts in IK.

The community elders, TFGMUTA also viewed the integration of IK in the teaching of weather and climate as a way of reviving the traditional community gatherings that were used to teach children the indigenous traditions, history, practical skills, marital issues, weather patterns and farming. Children were taught gender roles by community elders at *banza/pachara* for the boys. The girls received indigenous gender specific education related to household chores and looking after the family.

The discussion with the community elders showed that, family gatherings were gendered spaces to educate the indigenous people of Manicaland. The education system was practically oriented. It prepared the children for adulthood roles and expectations. The research findings resonate with the findings by Mapara (2009) in the study of the Tangwena people in Manicaland where the elders played a significant role in bringing up the children into adulthood. The studies also confirm Odora Hoppers' (2002) findings that indigenous education prepared children for adulthood roles. The observed practical nature of the indigenous people

of Manicaland is confirmed by Mahlatsi's (2017) research which confirms that IK education was meant to create food, shelter and self-reliance. Interviews and FGD with community elders in Manicaland views revealed that, IK integration should be practical oriented in which learners are taught practical skills for survival. Further, the elders could be invited in schools to teach IK. Community gatherings could be revived in which both boys and girls were taught gender related education by the elderly family members.

The children were also taught *unhu/ubuntu* values such as respect and assisting the elderly. A child was for the whole community and the child was expected to assist every elderly person, a view supported by Mahlatsi (2017). For the community elders, the teaching of IK should go beyond teaching IK related to weather and climate but to also include the indigenous practices that builds a total person (Sigauke, 2016). The community elders in the current study viewed indigenous education as holistic in nature and that which cannot be taught in parts. This view is supported by Stephens (2000) who acknowledged that IK is holistic in nature. Family gatherings are important in teaching IK related to weather and climate to the students. The learners can use these family gatherings to research weather related tasks given to them by the teachers.

5.4.2 IK can feature in form of local language/dialect usage

Teachers and community elders believed that IK can feature in the teaching of weather and climate in Geography in the secondary schools in form of local language usage. The findings discussed in this section are summarized in table 4.11, in chapter 4.

5.4.2.1 Rudzi rwemakore (Types of clouds)

Teachers and the community elders had some difficulties in coming up with the local language terms/concepts used to describe all the types of clouds; however, they were able to identify the common clouds that can feature in the study of weather patterns. TFGBUH6 and TFGMUT2) concurred that there are clouds called *mvumi (*Shona dialect). The cloud has a vertical extension. This was regarded as rain bearing cloud by teachers in Buhera and Mutare districts. The local community expects some rains once they observe the appearance of *mvumi* (cumulus clouds). The vertical development of the *mvumi* cloud suggests instability conditions. This resonates well with Barry and Chorley (2003) who associated clouds of vertical extension with

thunder and lightning. Barry and Chorley (2003) described cumulus clouds as heaped in form. The vertical development of the cumulus clouds is a result of convective uplifting of warm air that expand and continue to rise (Barry & Chorley, 2003).

Another type of cloud commonly described by the indigenous people in Manicaland which could feature in the teaching of clouds in the secondary schools is the one called *ruseto/hanga* (cirrus cloud). The name of this cloud came out in three FGD namely TFGBUH, CFGBUH and CFGCHIP. Further, CFGBUH3 and CFGBUH1 described *ruseto*/cirrus as feathers of guinea fowl, cream-like or silver-like. Both teachers and community elders agree that *ruseto*/cirrus cloud is feathery like and can be characterized by moon/sun halo. Its occurrence heralds the coming of the rains in the near future. The description by teachers and community elders resonates well with the description of cirrus clouds given by Grace, (2008) and Barry & Chorley, (2003) who described cirrus clouds as feathery-like clouds. The observation by elders that once they see *ruseto*/cirrus cloud in the sky they would know that rain is about to come is in line with the western science explanation. This is so because the cirrus cloud is associated with the approach of a warm front which will result in some rains within a short period of time (Barry & Chorley, 2003; Grace, 2008).

The third type of cloud that the teachers felt should feature in the study of weather and climate on cloud types was "*gore rehore*" in the local language (*Shona*). TFGMUT3 referred to it as nimbostratus. Nimbostratus cloud was described as a dark grey cloud associated with heavy down pours. The cloud is associated with continuous rainfall (Buckle, 1996). *"Gore rehore'* was described by the teacher as '*mvura yehore*' (continuous rain) or cyclonic rains.

5.4.2.2 Mhando dzemvura (Precipitation forms)

The study observed that there are different types of rainfall which can feature in the study of rainfall types in the secondary schools. CFGCHIM2 found that, those thunderstorms can feature as *senyeka* in the local language in the teaching of rainfall types in the secondary schools. This is intense rainfall that occurs after intense heating and evaporation is called convectional rainfall (Barry & Chorley, 2003; Waugh, 2009). The teacher (CFGCHIM2) identified *senyeka* as rainfall associated with westerly air mass called *nhuruka*. The air mass blows from the west to the east. CFGCHIM1and CFGCHIM2 agreed that *senyeka* is

characterized by dark coloured cloud that covers the entire sky. The darkly coloured cloud produces heavy down pours.

TFGNYA3 identified another type of rainfall as '*mvura yembambara'*. This is heavy down pours caused by southerly winds unlike *senyeka* that is caused by *nhuruka* (westerly winds). TFGCHIM2 and TFGMAK1 also revealed that a drizzle can feature in the local language as '*guti'*. It is prolonged rainfall. The teacher was of the view that drizzle can feature as *guti/mubvumbi* in the teaching of rainfall types in the local language.

TFGMAK1 identified three types of rainfall namely *gukurahundi, mavurachando and bvumiramitondo,* in the local language. The study observed that in the existing Geography syllabus there are mainly three types of rainfall namely conventional, relief and cyclonic rainfall (Geography syllabus, 2015-2022). The Eurocentric classification of these rainfall types is based on the process of rain formation. On the other hand, the Afrocentric/Indigenous classification of rainfall types namely *gukurahundi, mavurachando* and *bvumiramitondo* is based on the function performed by the rainfall type and the time in which the rain falls. *Gukurahundi* rain washes away millet residues on the *dwalas* after winnowing. A *dwala* is a near level rock outcrop that develops where basal surface has been exposed to the surface by several cycles of erosion. Traditionally the indigenous people of Manicaland thrashed and winnowed millet on the rock outcrops. *Mavurachando* contributes to the onset of cold conditions in the winter season and *bvumiramitondo* causes sprouting of trees such as *mnondo* at the onset of the summer season.

The indigenous people had their classification of rainfall based on function achieved by the rainfall type and classification by time in which the rainfall type occurred. For example, *gukurahundi* has been classified by function since the rains wash away crop residues from the *dwalas* where thrashing of millet and sorghum takes place. *Mavurachando* is classification by the time the rain occurs. It usually falls during the onset of the winter season.

The findings from this research identified more types of rainfall (*gukurahundi, mavurachando: bvumiramitondo; bumharutsva*) which are not documented in the current Eurocentric Geography syllabus and literature used in the secondary schools in Zimbabwe. The three types of rainfall in the current Geography syllabi in Zimbabwe are convectional, relief and cyclonic (ZIMSEC Geography syllabus, 2015-2022). The three types have been classified based on the

process of rain formation. Secondly the study found that, rainfall types identified by the indigenous people can be classified by the function of the rainfall type and the time in which the rain occurs.

5.4.2.3 Mhepo/Dutu (Air masses)

CFGCHIM2 and CFGCHIP1 concurred that there are mainly two types of air masses that affect weather patterns in the area that could feature in the teaching of the types of air masses in the secondary schools. The most common was *nhuruka* (westerly winds) and *mhepo yekumabvazuva* (easterly winds): *Nhuruka* blows from the west to the east and brings in some rains. *Mhepo yekumabvazuwa* (easterly wind) blows from the east and pick up moisture in the Indian Ocean that would build up in the west. The teachers and community elders came out with two types of air masses.

Zimbabwe is generally affected by the South-East, North-East, North West and South-West winds. These air masses affect the weather patterns in Zimbabwe (Buckle, 1996). The participants came out with two types (*nhuruka* and *mhepo yekumabvazuwa*). The indigenous people were more concerned with air masses that affect their daily activities such as farming. For the indigenous people of Manicaland, *nhuruka* is important as it brings in some rains. *Mhepo yekumabvazuwa* is relevant for them since it indicates that the rain season is about to start and people begin to prepare their farming activities. The integration of these air masses in the study of weather and climate is significant as these air masses influence the day to day activities of the local community of Manicaland.

5.4.2.4 Mwaka (Seasons) and Cultural border crossing

The study observed that the indigenous people have local language terms they use to describe seasons that could feature in the teaching of seasons in the secondary schools.

CIMUTA1 suggested four seasons in the local language that could be integrated in the Geography curriculum and feature in the teaching of *mwaka*/seasons. The seasons suggested for integration in Geography are *chirimo* (hot and dry season); *zhizha* (rain season); *matsutso* (harvesting season) and *chando* (cold season).

TFGMUT1 managed to identify two seasons (*chirimo* and *zhizha*). CIMUTA1 came up with four seasons (*chando, zhizha, matsutso* and *chirimo*). The elder possibly came out with more seasons from his experience as an elderly person as well as being a retired teacher. The teacher and the community elder are of the view that these four seasons in the local language could be integrated in the Geography curriculum and they could feature in the teaching of seasons under the topic of weather and climate.

The research concludes this section by noting that the indigenous people of Manicand have local languages they use to explain weather and climate concepts. These local terms could be integrated in the teaching of weather and climate. Several scholars (Akeinhead & Michell, 2011; Kaya & Lyana, 2014; Khupe, 2014; Msimanga & Lelliot, 2013) have indicated the importance of using local language in teaching. In Canadian schools, Dennis (2010) found that the local language was used in integrating IK in classroom teaching. It was observed that lessons conducted in the local language were more interesting and students' participation was very high. Kaya and Lyana (2014) observed that learners were able to express themselves with ease when they use their local language. In support of this assertion, Khupe (2014) in the study of IK in Mqatsheni, observed that learners were more fluent and used rich language when they expressed themselves in isiZulu, their local dialect.

In the current geographic context, Zimbabwe inherited the British education system in which English is regarded as the official language. Books and Geography syllabi are written in English. The teachers themselves have been trained in English. At home, particularly in rural settings parents communicate in the local dialect which is *Shona*. Students therefore struggle when they get to school and are expected to communicate in English (Lukong, 2016). In a study of inclusive education in Cameroon, Lukong (2016) found that children learn best in their mother language. Learners struggled to understand concepts where foreign language was used as a medium of instruction (Lukong, 2016). Aikenhead (1996) referred this transition from one culture to another as 'cultural border crossing'. In this study, this cultural border is when learners study Geography concepts in English yet they grew up speaking the local language which is *Shona.* Integrating IK in the Geography lessons therefore becomes the **cultural bridge facilitating an easy border crossing for learners**. This is supposed to enhance learners' understanding of geographical concepts.

5.4.3 IK can feature as cultural practices and experiences in weather and climate

This section discusses the findings on the cultural practices and experiences of the indigenous people of Manicaland that can be integrated into the Geography curriculum and feature in the teaching of weather and climate in the secondary schools. The cultural practices and experiences used by the indigenous people of Manicaland as measuring instruments to predict weather are biological, atmospheric features and rain making ceremonies.

5.4.3.1 Indigenous biological ways of weather forecasting

The findings from the teachers and community elders established that there are indigenous biological methods of weather forecasting that could be integrated in the Geography curriculum and feature in the teaching of weather and climate in the secondary schools. The findings on indigenous biological ways of weather forecasting discussed in this section have been summarized and presented in table 4.12**,** in chapter 4.

5.4.3.1.1 Plant morphological changes

Both the elders and teachers strongly believed that the knowledge of plant changes to predict weather should feature in the teaching of weather forecasting in the secondary schools. The amount of fruits produced by fruit trees was most cited as an indicator of the pending weather conditions. Both the teachers and elders agreed that when wild fruit trees such as *chakata* tree (*Parinari curatellifolia)*, mango trees, *muzhanje* (uapaca kirkian) *mupuri* (fruit tree) produce a lot of wild fruits, it was a sign of a drought season. In a study of the Batonga traditional knowledge on weather forecasting, Siambombe, et al., (2018) observed that, the production of large quantities of wild fruits such as baobab was a good indicator for dry conditions in the following season. The indigenous people relied on inference, observation and repetition of events as envisaged by Stephens (2000). They made such conclusions after repeated events of plenty of fruits followed by drought conditions. The indigenous people strongly believed in the spiritual world. The local community believed that, the ancestors provide the living with fruits so that they survive during the drought period. Dei (2013) observed that the indigenous communities linked their knowledge to the spiritual world. Arunotai (2006) in studies carried out with the nomads from Thailand and among the Chewa in Malawi realized that the local people offered food to the ancestors before eating. In this study CFGCHIM2 explained a situation in which at a rain making ceremony people would pour beer onto the ground so that

the elders would partake as well. It is this strong belief in the ancestors which the local people believe that, the ancestors provide fruits in preparation for a drought.

It was also observed that the shedding of tree leaves was used to predict *chirimo*/the dry season. The weather conditions would be dry and windy. The sprouting of trees was associated with *zhizha*/a beginning of the rainy season, hot conditions and instability conditions. The most common trees cited by the participants that shed off leaves during the dry season and sprout at the start of the rain season were *mnondo* (julbernardia globiflora*)*, *msasa* (brachystegia spiciforms)*, mupfuti* (brachystegia boehmii) and *muonde* (Fig tree). The findings resonate well with the studies carried out in Uganda by Okonya & Kroschel (2013) who observed that the shedding of leaves by some plants was a sign of the start of a dry season.

CFGMUTA in a FGD in Mutasa district agreed that, they use lichens to forecast weather. Lichens that grow on bare rocks in the area are green when the atmosphere is moist. The lichens become yellowish under dry conditions. The yellowish colour is due to excessive evapo-transpiration resulting in a loss of moisture within the grass. As the rain falls, the grass absorbs moisture and become turgid and green. Rosenzweig & Neofotis (2013) attributes the changes in plant morphology as a result of the changes in atmospheric temperature, humidity and pressure. It is therefore possible that plants shed leaves, sprout and change the colour of leaves as a result of the dynamic effect of weather elements.

The morphological changes used to predict weather by the indigenous people in Manicaland resonates well with the work of Waugh (2009) who noted that plants adapt to environmental changes. They shed off leaves to reduce transpiration during the dry and hot season. The plants sprout often due to winter rains and evapo-transpiration that causes moisture to rise and plants to germinate. Plants also 'shrink' their leaves to reduce transpiration by limiting the surface area exposed to sun light (Waugh, 2009).

Morphological changes have been used immemorial to forecast weather. Muguti and Maposa (2012) have shown how the indigenous people used plant changes to predict weather in the South –eastern parts of Zimbabwe. The drying and falling of leaves was regarded as indicative of a pending dry spell whereas shrinking of leaves without falling to the ground was used to predict some coming rains in the near future. It is possible that, the shrinking of leaves is due

to high evaporation that result in rain being experienced in the near future. Similarly, Makwara (2013) has also studied IK in parts of Masvingo in which it was found that the local people used plant changes to predict weather for their day to day activities. The study by Makwara (2013) observed that, the high flowering and production of wild fruits from wild loquat (*mushuku*) and *muchakata* (*Parinari curatellifolia)* was a sign of a pending poor rainfall season (Makwara, 2013).

5.4.3.1.2 Zoological markers: Birds' migration and behaviour

Most of the community elders namely CFGMUTA3, CIMUT1, CIBUH2, CICHIP2 and CICHIM1) and TFGBUH2 agreed that, birds' migration and behaviour are used to predict weather patterns. They firmly believed that, this knowledge of birds' migration and behaviour can feature in the teaching of weather forecasting in the secondary schools. The most common bird that is used to forecast weather in Manicaland province is the *haya* bird (rain bird). Muguti and Maposa (2012) in their studies in Zimbabwe observed that *haya* bird was commonly used to forecast weather in the south-eastern parts of Zimbabwe.

The continuous squeaking of the bird was taken by the community as a reliable indicator of pending rains. It was believed that the squeaking of the *haya* bird (rain bird) continuously was a good sign that rainfall is expected soon. Okonya and Kroschel (2013) in their studies of IK carried out in Uganda found that, the squeaking of birds was among the most reliable predictor of the coming of the rains within a short period of time. Rosenzweig and Neofotis (2013) attributes the changes in the behavior of plants and animals to changes in pressure, humidity and temperatures. It is therefore possible that the rain bird squeaks in response to changes in weather conditions. The *haya/dzvotsvotsvo/koriro* bird was cited by many participants as a good indicator of the coming of the rains.

Some communities (Buhera Mutare and Chipinge districts) identified the bird as *dzvotsvotsvo* referring to the continuous squeaking it does when it is about to rain. *Koriro* is a sound produced by the rain bird to predict drought conditions. The name *koriro* was mentioned in the South- eastern districts. This reflects language differences across some districts.

Although the name of the rain bird varied according to variations in dialect, the interpretation on predicting weather conditions remained the same. For effective integration and teaching of

IK in secondary schools, teachers, should take into consideration dialectical variations of IK concepts that mean the same thing.

Secondly, the birds used by the community to predict weather after the *haya* bird, was the migration and presence of *mariti/magwirokwiro* (stork birds). The community believed that the presence of *magwirokwiro* and *mariti* (stork birds) which are not normally seen, are an indication that rain is coming in the near future. Just like plants, animals adjust to environmental conditions. The stork birds migrate into Zimbabwe in search of food at the beginning of the rainy season in summer in the Southern hemisphere. The summer season is wet and is associated with flourishing insects and sprouting grass for the stock birds to feed on during the summer season. In the Northern hemisphere there will be dry conditions and therefore the stork birds migrate to the South. The 'crying' and migration of birds as an indicator of a pending wet season have been reported in India (Archarya, 2011); Tanzania (Chang'a, Yanda & Ngana, 2010) and in Swaziland (Musa & Omokore, 2011). The birds however may vary with geographical location.The behavior of fowls was the least mentioned in the discussion with the community elders and teachers. It was mentioned in one focus group discussions with the teachers.

TFGBUH2 observed that, if chicks move out from the brood in search of food when it is raining it indicates that the rains would be experienced for a long period of time. Usually the fowls don't want to get wet from the rains unless the rains are light and of a long duration. Mhita (2006) observed that before the advent of modern weather forecasting, the indigenous people of Tanzania made use of the behaviour of plants and birds to predict weather conditions and to cope with climatic variability. Mapara (2009) observed that, the Tangwena people could foretell the duration of rain by observing the behavior of fowls. If the fowls don't come out to feed, the rain would just last for a day. If the fowls come out to feed while it is raining the rain would last for some days.

The behavior, presence and movement of animals and insects were viewed by the community elders and teachers namely CFGBUH3, CIMUT1, TFGCHIM4 and TFGCHIM5 as good indicators of weather forecasting which can feature in the teaching of weather and climate in the secondary schools. The unusual movement of animals such as baboons into the field and homes in search of food was seen by CFGBUH1 as a sign of a dry upcoming season. Animals adapt to environmental changes and it is possible that the baboons move around everywhere in

search of food when there is prolonged drought. CIMUT1 also observed that cattle calves run around raising their tails in the air when it is about to rain. The findings are confirmed by Archarya (2011) in the studies of IK in India in which the behavior of animals have been reliably used to forecast pending typhoons and flooding. Archarya (2011) observed that animals adjust to pending dangers.

Cattle were observed to jump around when the rains are just about to arrive. This could be in response to the cool breezes of moist air in the atmosphere. TFGCHIM4 and TFGCHIM5 further pointed out that a painful backache was an indication of pending humid, cloudy and cold conditions in the near future. The human body also responds to weather changes. This can explain why elderly people complain of back pains whenever weather is changing. In the studies carried out in Uganda, Okonya and Kroschel (2013, p.646) found that, the local people in Uganda "used body pains to predict the occurrence of rain within 3 days".

Plants and animals respond and adapt to environmental changes as envisaged by Waugh (2009). The behavior changes in animals including human beings can be explained by Rosenzweig & Neofotis (2013) who found that, the changes in the behavior of plants and animals may be due to barometric, temperature and humidity changes in the atmosphere. A prolonged upcoming dry season can force baboons to search for food everywhere.

It was also established from the teachers, TFGCHIM3, TFGCHIM4 and TFGCHIM1 that, the presence and movement of insects signify wet conditions in the near future. TFGCMIM1 believed that when the white butterflies (*mabepeteswa* in local language) migrate to the east it was a good sign of a pending rain period. TFGCHIM4 observed that the running around of spiders (*dandemutande* in local language) predict an imminent *guti* (cloudy) conditions. TFGCHIM3 viewed the coming out of ants (*zvitedza* in local language) from their mounds as a sign of pending rains. The findings are contrary to Okonya and Kroschel (2013) studies in Uganda where they found that, the movement of insects were a sign of pending dry conditions. The contrary findings might be a result of differences in the area under study. The insects found in Zimbabwe and Uganda may be different due to climatic variations. The insects referred to by Okonya and Kroschel (2013) could be different to those explained in this study. However, studies done in Zimbabwe by Muguti and Maposa (2012) in Manicaland and those done by Makwara (2013) in Masvingo confirm that the presence and movement of insects was a sign of coming rains within a short period of time. The findings on the movement and presence of

insects to predict pending moist, humid and rainy conditions in few days to come is also confirmed by studies carried out by Chand, Chambers, Malsale and Thompson (2014) in a case study of Vanuatu in the Pacific islands. Chand et al. (2014) observed that the presence of cockroaches and ants which were signs of a rainy period in the upcoming few days. The presence of insects is likely to be a result of hot and humid atmosphere that result in unstable atmospheric conditions that yields some rains. This is supported by Tiwari &Tiwari (2011) and Rosenzweig and Neofotis (2013) who found that those living organisms such as plants and animals respond to temperature, humidity and pressure changes.

5.4.3.2 Atmospheric features used by the Indigenous people to predict weather

The section discusses the findings on atmospheric features and processes used to forecast weather that could feature in the studies of weather and climate in the secondary schools. The findings have been summarized in table 4.13 in chapter 4.

5.4.3.2.1 Makore (Clouds)

The most common clouds that are used by the local people of Manicaland to predict weather patterns which the participants believed could feature in the teaching of weather forecasting in the schools are *mvumi* (cumulus) and *ruseto* (cirrus) clouds:

TFGMUT2 identified two types of clouds of that could feature in the Geography lessons on weather forecasting. These are *mvumi* (cumulus) whose development shows that some rainfall is expected. *Mvumi dzamira* is referring to clouds with vertical extension in form. Barry and Chorley (2003) and Waugh (2009) describe cumulus clouds or *mvumi* in *Shona* language as clouds with a flat base and a vertical extension. The vertical development of the clouds is caused by vertical uplifting of unstable air and hot conditions. In Uganda, Okonya and Kroschel (2013, p.646) found that, the local people would "predict some rains 1-3 days after very high temperatures are experienced". The unstable uplifting of air due to high temperatures causes rain to occur within a few days (Barry & Chorley, 2003). Okonya & Kroschel (2013, p.646) found that the local people of Uganda used "nimbostratus clouds to predict pending rains". The common aspect is that the people in Uganda and those in Manicaland both use cloud type and appearance to predict upcoming rains. Both nimbostratus and cumulus are rain bearing clouds (Barry & Chorley, 2003).

The second type referred to by the teacher that is used by the local community to predict weather is *ruseto* (cirrus). *Ruseto* appeared like feathers of a guinea fowl. The appearance of *ruseto* signifies pending rains. The community elders and teachers namely CFGCHIP1 TFGMUT2, TFGBHU1andTFGBHU2 concurred that *ruseto* clouds are feathery in appearance and they predict the coming of the rains within two weeks. The use of *ruseto* to predict rain of long duration within two weeks was regarded as very reliable indicator of weather patterns. *Ruseto* is often characterized by moon/sun halo. The appearance of a halo is a sign of a coming warm front associated with rainfall of long duration.

5.4.3.2.2 The moon and the sun

The community elders believed that the understanding of moon phases and *dziva remvura* (moon/sun halo) should feature in the teaching of weather forecasting in the secondary schools. CFGCHIP3 is of the view that rainfall is expected '*mwedzi uchatawa, uchabve kubarwa'* (in the first quarter) and '*mwedzi wosvibirwa'* (last quarter of the moon). The elders did not therefore expect to receive some rain during full moon (*jenaguru*). Indigenous science sometimes depended on inference. The elders would have observed the phenomenon for a long period of time and then made conclusions. The findings from the community elders were confirmed by Chand et al. (2014) in the case study of Vanuatu in the Pacific Islands. The community of Vanuatu used the appearance of the moon/ sun halo to predict the coming of the rains. The community believed that the appearance of the moon/sun halo signified the coming of the rains in the short-term period. Similar studies by Okonya and Kroschel (2013) in Uganda confirm that the community used the appearance of the moon to forecast weather. The Ugandan community believed that the full moon was a sign of an upcoming dry season.

CIMUT1 believed that there was a relationship between the size of the circle (moon/sun halo) and the amount of rainfall expected. The bigger the circle around the moon /sun the more rains are expected to fall. The colour of the cloud surrounding the moon/sun is also important in determining the amount of rainfall. A dark cloud surrounding the moon/sun is a sign that more rains would fall. The explanation given by the elder on the sun/moon halo on predicting rains within a short-term period fits well with the scientific explanation. The presence of a sun halo is a sign of stratus clouds and a warm front that eventually builds thicker rain bearing clouds and rainfall (Barry & Chorley, 2003; Buckle, 1996).

5.4.3.2.3 Mhepo/dutu (Airmasses)

The research established that few elders and teachers have knowledge on types of air masses they use to foretell weather patterns. They were however positive that these air masses in their local language can feature in the teaching of weather forecasting in Geography lessons in secondary schools. The most common air mass cited by the community elders and teachers that brings rain that covers a wider region is called *nhuruka/ mhepo yekumavirira* (westerly winds). These are winds that blow from the west to the east. Most of the elders and teachers, CFGCHIM2, CFGBUH1, CFGBUH2 and CFGMUT2 believed that an air mass that blows from the west to the east (*nhuruka*) would bring into their area dark clouds and heavy rains within a short period of time. *Nhuruka/ mhepo yekumavirira* is associated with dark clouds (nimbostratus) and *senyeka* (heavy rains). The findings concur with the studies in Uganda carried out by Okonya & Kroschel (2013) who observed that in Uganda winds that blow from the east to the west (easterly winds) indicates upcoming dry conditions. On the contrary winds that blow from the west to the east (westerly winds) are associated with the rainy season. Usually *nhuruka* was mentioned in conjunction with *mhepo yekumabvazuwa* (easterly winds) which signified the start of the rain season. *Mhepo yekumabvazuwa* (easterly winds) blow from the Indian Ocean. It brings some rains that are confined to the Eastern parts of Zimbabwe which are mountainous; unlike *nhuruka* that bring wide spread rains.

The occurrence of *chamupupuri* (whirlwind) was also used by the indigenous people of Manicaland to predict the coming of the rains. In an FGD in Buhera district with community elders, the high frequency of whirlwind was used to predict the coming of thunderstorms in the near future. *Chamupupuri* is a localised circulation of air that blows up some objects such as papers, dry leaves and dust into the sky. The description of the rising up of objects suggests unstable conditions in the atmosphere which can lead into a thunderstorm. Whirlwind occurrence is common on a hot weather spell. There is logic in the elder's interpretation that high frequency of *chamupupuri* (whirlwind) is used to predict the coming of the rains since the circulation of air is indicative of a low-pressure cell caused by intense heating of the ground surface. Excessive heat was viewed as a sign of pending rains in 1-3 days in Uganda (Okonya & Kroschel, 2013). Scholars (Okonya & Kroschel, 2013) observed that the local community of Uganda used the presence of whirlwind to predict upcoming rains. The elders and teachers therefore believed that, air masses can feature in the teaching of the topic on weather forecasting in the secondary schools due to reliability of these air masses in predicting weather.

5.4.3.2.4 Mapisire ekunze (Temperature variations)

TFGBUH5 and CFGCHIM2 believed that, the knowledge on either *kupisa kwekunze* (hotness) of the environment or *kutonhora* (coldness) of the environment can be integrated in the Geography curriculum and feature in the teaching of weather forecasting in the secondary schools. Excessive heat was viewed as a sign of pending rains in 1-3 days in Uganda (Okonya & Kroschel, 2013). Excessive heat causes maximum evapo- transpiration and atmospheric instability. Intensive heating of the ground results in low pressure at or near the ground surface (Aguado & Burt, 2010). This causes convective uplift of warm air mass. The air then cools adiabatically to result in thunderstorms. On the contrary cold dense air resists uplift resulting in stable conditions leading to clear skies and fine weather clouds (Christopherson, 2012).

5.4.3.3 IK can feature as Rain making ceremonies in weather and climate studies

The study revealed that in Manicaland the indigenous people put great emphasis in rain making ceremonies which they feel should feature in the teaching of rainfall formation in the Geography lessons in secondary schools. UNESCO (2017: 1016) article 12 advocated for indigenous people to teach their "spiritual and religious traditions, customs and ceremonies". The document justifies the inclusion of rain making ceremonies which could be infused in the teaching of rainfall formation in Geography. CFGHIP1 and CFGCHIM2 revealed that each traditional leader practice rain making ceremony at sacred places in request for some rains and protection from environmental hazards. The rain making ceremony is referred to as *doro* re*musoso/mukwerera.*

It emerged from interviews and FGD with community elders that, the rain making ceremony is practiced in sacred places such as forests, mountains and under sacred trees such as *muonde* (fig tree) and *mupanda* (lonchocarpus capassa). In the North East of Manicaland the brewing of the beer is done in '*Mabinga'* (mountainous forest area) in the Mutasa-Nyanga area; '*Kushara'* (forest where Chiefs are buried) in Chief Satiya, in the Eastern part of Manicaland; '*Nyamazha'* (forest area) in Chief Muusha and '*Mugwasha'* (forest in Ngaone) in the southern part of Manicaland.

It was observed that the indigenous people of Manicaland link sacred places such as mountains, forests and sacred trees with the presence of the ancestors. There is a link between the tangible

(living things) and the intangible (ancestral spirits). The indigenous people find the tangible (forests, mountains, sacred trees, beer) as a link in which they communicate with the ancestors. Dei (2013) observed that the ancestors can be linked through objects. The findings are consistent with the study carried by Khupe (2014) who found that, the Mqatsheni community in South Africa constructed grass thatched houses at each homestead. The hut was regarded as a link with the ancestors. The community believed that the ancestral spirits stayed in the grass thatched grass. The study also observed that during rain making ceremonies, it was a common practice to pour beer and leave it for *masvikiro/ marombe* (ancestral spirits) to partake. This finding is also linked to similar practices in Thailand and Malawi (Arunotai, 2006). The pouring of beer into the ground was done to appease the ancestral spirits so that in turn they offer a fruitful rainy season and protection from environmental hazards. This view was also held by Aikenhead and Michelle (2011) who observed that the indigenous people attached importance to sacred mountains and forests.

The second type of rain ceremony offered to the ancestors is *zvitsanza* which is placed at different points at the margins of farming land. *Musoso* and *zvitsanza* are all rain making ceremony beer. *Musoso* beer is brewed after every one year. In the other year, in replace of *musoso* people would brew beer called *zvitsanza*. The difference between the two is that the ceremony for *musoso* involves what they call *kuridze mhururu* by the community (ululation during the process of offering the beer to the ancestors by the headman or village head). For *zvitsanza* the community does not come together *kuridze mhururu* (to ululate) during the process of offering the beer to the ancestors.

The rain making ceremony beer (*musoso/mukwerere*) has special conditions. Firstly, the beer was brewed by elderly people. The second aspect that characterized *musoso* beer was that it was brewed under a temporary enclosure (*musasa*) constructed out of tree branches. The fourth aspect was that there was sacredness in the way the beer was brewed. The elders would sleep in the enclosure for the period the beer was brewed. The element of purity and respect for the ancestors is important for the ancestral spirits to accept the offering. The fifth element was the spirit of *ubuntu* that was portrayed through a sharing of the beer with people from all corners of the community. Matsuhira (2013) found similar features of a rain making ceremony being practiced in the Nyandoro region in Zimbabwe. The rain making ceremony (*mukwerere, bira*

rekukumbira mvura or *'rukuruva*) as practiced at a shrine made up of grass thatched hut. The spirit medium conducted the ceremony. The beer was brewed by the elderly women and characterized by traditional music and clapping to the ancestors as a sign of respect.

5.4.4 Part 3 Summary

It has been revealed in this section, that IK can feature in form of pedagogical issues. It was established that IK can be integrated and feature in the classroom context as an introduction to the lesson; as infused IK; as selected IK concepts or as a project or taught module on indigenous knowledge. It was also established that IK can be taught in the context of family gatherings. The community elders can engage with the school, teachers and students to discuss indigenous practices and experiences. The teachers viewed IK and WS as complementing each other. The researched unpacked that education in the classroom should be practical oriented and participatory in nature. Education should equip learners with survival skills. The research established that IK can also feature in form of using the local language (for concepts) in the teaching of weather and climate. Further the study revealed that IK can feature in the teaching of meteorology as cultural practices and experiences. This can be unpacked in form of various methods of predicting weather. Lastly, this section revealed that the spiritual world forms the foundation of the indigenous people of Manicaland belief systems and cultural practices. The elders believed that their ancestors can interact with them through rain making ceremonies. The appeased ancestors would in turn provide the community with a fruitful rain seasons free of environmental hazards. The *ubuntu* values have been found to prevail through their cultural practices as there is sharing of food, beer and working as one united family.

The study therefore recommends that any effective integration and teaching of IK related to weather and climate should take into consideration the indigenous people's beliefs, values and their cultural experiences.

5.5 PART 4: THEORY CONSTRUCTION: POSSIBLE CHALLENGES TO IK INTEGRATION

Part 3 of the study discussed the findings on how IK can feature in the teaching of weather and climate in secondary schools. The current section, discusses the findings on the challenges that may hamper the integration and teaching of IK of weather and climate in secondary schools

and it highlights key theoretical insights. Common challenges from all the participants are discussed first followed by an analysis of the findings from specific groups. Figure 5.2 provides a summary of challenges that were advanced which may be faced in the integration of IK in the Geography syllabus.

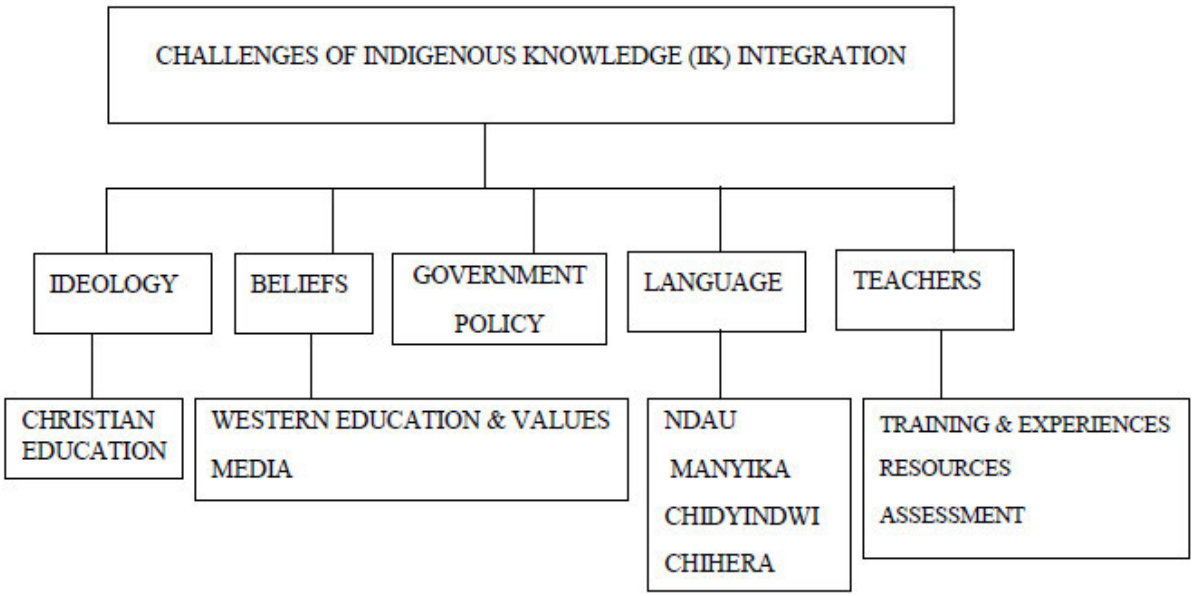

Figure 5.2: Indigenous knowledge integration challenges (Field data, 2018)

The challenges, grouped into five broad categories (Figure 5.2) namely ideology, beliefs, government policy, language and those challenges related to the teachers are elaborated on below.

5.5.1 Common challenges of IK integration

Common challenges are impediments to IK integration that emerged from all groups of participants namely, community elders, teachers and education officials. The education officials are MPGI and MPCDO. The common challenges that emerged from all categories of participants are ideological challenges and western beliefs and values.

5.5.1.1 Ideological Challenges

FGD with community elders revealed that, Christian education ideology introduced through Missionary activities is an impediment to IK integration in the Geography syllabus in secondary schools. CFGCHIM1 and CIMUTA2 concurred that, Missionary activities and

churches preached Western ideology that was against indigenous cultural practices. The elders blamed the decline of people practicing rain making ceremonies to those religions that viewed indigenous practice as evil. TFGCHIP3 in a FGD viewed the role of the indigenous practice of *mukwerere* (rainmaking ceremonies) being overtaken by fasting and praying for the rains. The new generation of teachers and students have grown up in an environment where Christianity in Zimbabwe is viewed as modernity and indigenous practices as out dated. Nyati (2001) observed that the introduction of missionary activities resulted in indigenous people believing that their IK was wicked. This poses a challenge for the parents to accept IK being taught in the Geography lessons. In East Africa and Uganda, Adyanga (2011), reported Christian missionaries who built schools with the main purpose of indoctrinating Chiefs and their subordinates with western culture and ideology. Indoctrinating western culture was aimed at Africans despising their indigenous culture in favour of the western values (Adyanga, 2011). In Zimbabwe, the first missionary schools such as St Augustine's high school was meant to impart western values to the indigenous people who would in turn despise their own indigenous practices as evil (Zvobgo, 1997).

On the other hand, teachers believed that, religious institutions have got an influence in deciding the content that could be taught in the schools. TFGMUT2 felt that, the integration of IK in the teaching of weather and climate in secondary schools can be hampered by religious institutions that can select IK content to teach in institutions under their control. The indigenous practices were viewed by missionaries as working against the teachings of Christianity in Zimbabwe. Some parents who do not believe in traditional practices discourage their children from learning about traditional culture and practices. Seehawer (2018) in a study with South African Science teachers observed that, some religious denominations discouraged teaching indigenous practices in the schools as they viewed these IK practices as evil and against their ideology of spreading Christianity. In Zimbabwe, there are schools that are run by churches such as Catholic and Adventist schools. The schools have their own philosophy, norms and values which they feel should be taught at their schools. The responsible authorities can choose to resist the integration of IK that is against their philosophy and values. Vandeleur (2010) observed in the study of C2005 in South Africa that, teachers who were teaching in some religious institutions had some challenges of implementing indigenous technology and culture since the institutions required them to follow certain procedures and protocols aligned to their religion. Shizha (2006) observed that colonial education in Zimbabwe regarded IK as primitive

and irrelevant to their economic interests. Those schools that may regard indigenous education as inferior may resist incorporating IK in the teaching of weather and climate in the secondary schools.

5.5.1.2 Beliefs

Interviews and FGD with teachers and community elders established that beliefs can be a hindrance to IK integration in the teaching of Geography. The beliefs discussed in this section are western education and media and technology.

5.5.1.2.1 Western education and values

Western education has been viewed as more superior than indigenous education. MPCDO observed that, parents' religious inclination can be an impediment to IK integration in the teaching of weather and climate. The MPCDO was of the view that, the failure by students to participate in traditional dance at school yet the same students can sing Christian songs was a sign of parents supporting Christianity and western education at the expense of indigenous practices. Some parents even discourage their children from learning indigenous knowledge. In Zimbabwe, in particular private schools tend to promote Western culture through activities such as sports and the use of the English language. The perceived superiority complex of western education may hamper the integration and teaching of IK in the Geography class in the secondary schools. A study by Nyamnojoh (2012) found that, indigenising the curricula has been hampered by parents who felt that, sending their children to schools that offer Eurocentric education increases the chances of their children in getting employment. Similarly, at North-West University, Mmola (2010) observed that formerly white dominated campuses were resisting IK integration in the curriculum since they believed that western education was superior since it has set standards. Shizha (2006) and Mavhunga (2006) concurred by observing that independent African governments who wanted to change the Eurocentric curriculum faced resistance from the policy makers and the elite class who held the view that western education was the best. In addition, scholars (Shizha, 2006; Mavhunga, 2006) found that, the African post independent education system has been largely sponsored by European countries which makes it difficult to discard the Eurocentric education system.

The community elders, CFGCHIM1 and CFGMUTA2 believed that, the integration of IK in the teaching of weather and climate in Geography in secondary schools was hampered by parents who have acquired western education and engagement in formal employment. The community elders argued that, parents no longer have enough time to sit down and discuss cultural values with their children because parents are spending most of their time working formally in various institutions. Gumbo (2014) in a study in North of Pretoria observed that the concept of 'communalism' in which parents shared the responsibility of raising children has been destroyed by 'individualism'. Some family members are living apart due to urbanisation and formal employment opportunities which present itself far from their home. Furthermore, Gumbo (2014) noted that, parent-child relationship has been weakened as parents go to work and send their children to schools with a White western dominated culture. Further, elderly members who used to teach the children traditions and culture are now renting accommodation in different parts of urban areas. In a study on IK in Sri Lanka, Padmasiri (2018) observed that, it was a challenge for the community elders to impart IK to the children as a result of urbanisation which has changed family structures and community relationships. Similarly, Khupe's (2014) study of the Mqatsheni community reveals that, elders blamed the disintegration of the family structure as a challenge to IK integration. The youngsters were said to be disrespectful to elders making it a challenge for the elders to instill indigenous education to their children.

For the elders, integration of IK in the teaching of weather and climate involves the engagement of the community, the school and the learners. The elders feel that the teaching of IK does not only take place in the classroom. It also involves community engagement. The views by the elders of engaging the family elders in the education of the child is confirmed by Mapara, (2009) study in Zimbabwe. The study by Mapara revealed that, family elders (grandfathers, uncles) play a significant role in educating the boys practical and life skills at *padare* (homestead meeting) whereas the girls received education *yepamapfiwa* (education from the hearthstone) from their aunts and grandmothers. Khupe (2014) further noted that in the past it was the responsibility of everyone to raise the children. The role of elders in imparting education to the children has been employed in Lillooet area schools in Canada. The indigenous elders were willing to work with teachers in order to facilitate the teaching of IK in the schools (Graham & Ireland, 2008). The community elders played a major role in educating the children indigenous practices in Manicaland province. The disintegration of the family structure as

people migrate to different places for employment was therefore viewed as an impediment to imparting indigenous education to the children.

Interviews and FGD with teachers have shown that, cultural diversity in urban environments pose a challenge to IK integration and teaching in secondary schools. In a study with primary and secondary school teachers in South Africa, Seehawer (2018), revealed that, teachers were facing a challenge of teaching multicultural class composed of Xhosa, Zulu and *Shona*[13] learners from Zimbabwe. The teachers did not know whose culture (Xhosa, Zulu, Shona) they should integrate in in the classroom. Further, in the current study, the MPGI believed that people in urban areas were no longer familiar with African traditions. The teachers therefore lacked IK to teach in the Geography lessons on weather and climate. The challenge of inadequate knowledge on IK by the teachers is worsened by the fact that, there are few elderly people in urban areas to consult or invite to deliver a lesson on indigenous concepts. Tsindoli (2019), in a study of IK integration in Mathematics in Kenya, observed that, there were few indigenous experts who could be consulted as resource persons to teach IK concepts in Mathematics in the primary schools.

A FGD with teachers, TFGCHIM3 further observed that, in urban areas learners are exposed to different cultures from the internet services and social media readily available to them. This knowledge which they learn from the internet services may be contrary to indigenous practices thereby making integration in the Geography lesson a challenge. Gumbo (2014) in a study in North Pretoria observed that children were losing their *ubuntu* values as a result of emulating some television characters and view pornography on social media which is not in sync with African culture. The views by the teachers are in agreement with Luykx et al., (2005) who observed that, the integration of IK was a challenge to students with diversified ethnic and cultural backgrounds within the same class. The teachers believed that, it was a challenge to decide on IK content to teach in a multicultural class in which students are coming from different rural and urban backgrounds. Ndlovu, James amd Govender (2019) observed that, learners bring to the classroom knowledge which they have acquired from their homes. In Zimbabwe, this is more likely to happen in boarding schools that enroll students from different places who have different backgrounds and experiences on indigenous practices. However,

[13] *Shona* is a major indigenous language spoken in Zimbabwe

unlike Luykx et al. (2005), who viewed a multicultural class as a challenge, Manzini (2008) purported that, conflicting knowledge in a multicultural class does not hinder students' learning as long as their beliefs are considered in the learning process. The view by Manzini (2008) was further supported by Dreyer (2018) who perceived a multicultural class as positive to IK integration as students and the teacher can learn from each other through sharing information and experiences coming from different sources and different geographic space. The idea of sharing information is in support with *ubuntu* philosophy which is embedded in the African indigenous philosophy. Manicaland is composed of people with diversified cultural background. They consist of people who speak different dialects and belong to different religious groups (ZIMSTAT, 2012) In view of this diversity, the study supports multicultural class as this allows integration of IK on weather and climate from learners coming from different cultural and geographic spaces. This enriches the IK content and promotes interactive pedagogy in the Geography class, a view which is also held by Dreyer (2018).

5.5.1.2.2 Media and Technology

Community elders in Chimanimani and Mutasa (during the interviews and FGD) believed that, developments in media and technology were a challenge to the effective integration and teaching of weather and climate in secondary schools. The elders, CFGCHIM2, CFGMUTA2 and CICHIM1 believed that, the children were spending most of the time engaged in media and technology such as radio, television and social media. This has deprived them of time for the community elders to teach their children indigenous practices. Gumbo (2014) in a study on *ubuntu* carried out in Akasia, North of Pretoria elders bemoaned children spending a lot of time on cellphones chatting on twitter and Facebook at times to people they do not even know. Children are therefore divorced from parental guidance and instruction. Further, the research revealed that children were now spending much of their time viewing television and watching pornography on their cellphones and internet (Gumbo, 2014). In Manicaland, the elders perceived indigenous education received at the family gatherings as constituting part of the lessons received in the classroom. The elders' point of view is that, the teaching of IK in Geography lessons should not be restricted to the classroom. The teaching of IK is regarded by elders as a contribution from the community elders as well as from the teachers. The failure by the children to attend indigenous education at community gatherings due to media and technology is therefore a challenge to the integration and teaching of IK related to weather and

climate in secondary schools. The elders therefore feel that the schools should engage family elders to perform their traditional role of educating children on IK in the schools.

It is my proposition that the development of media and technology apart from being a hindrance to IK integration can also enhance the teaching of IK (Picton, 2019) in the topic of weather and climate. In a study on the use of media and technology in United Kingdom in the primary and secondary schools, teachers indicated that, the use of technology in teaching has several benefits including engaging learners, assisting struggling learners, providing individualised learning, time saving and assessing the students' progress (Picton, 2019). Both the teachers and the learners can research on IK related to weather and climate on the internet and get a better understanding and appreciation of IK practiced in different parts of Zimbabwe and world - wide. More so the teachers and the students can share information on IK using social platforms. United States Department of Education (2017) revealed that, the use of technology allows teachers to work together with their students as well as connecting with other experts and colleagues in improving teaching in the classroom. Media and technology can also promote e-learning (United States Department of Education, 2017) in the teaching of IK related to weather and climate. In a study on the use of technology in the United States, the United States Department of Education (2017), observed that, the use of video conferencing, and other online chats improve interactive learning between the teachers and students. Teachers, learners and community elders in Manicaland can share information on IK practices through interactive platforms such as online chats. This can improve on the IK content and teaching of indigenous practices related to weather and climate in secondary schools.

5.5.1.3 Shortage of elderly resource persons

The findings from CFGMUT2 and CFGCHIM4 in the current study revealed that scarcity of indigenous experts particularly in urban areas, who are knowledgeable on IK which poses a challenge to the integration and teaching of IK in Geography lessons in the secondary schools. In a study of IK integration in Mathematics in Kenya, Tsindoli (2019) found that, there were few indigenous experts who can teach the youth indigenous practices and traditions in Kenya. The shortage of knowledgeable elderly people in IK was perceived as an impediment in integrating IK in the teaching of Mathematics in Kenya. In Zimbabwe, elderly people in urban areas often retire to their rural homes once they are no longer employed in the towns. This

creates a shortage of elderly people who are supposed to be consulted as resource persons to teach IK in the Geography class. Both CFGMUT2 and CFGCHIM4 in FGD and MPGI in an interview alluded to the fact that, there is need for indigenous experts for effective integration of IK in the teaching of weather and climate. There is also need for documented resources on IK for use by teachers in planning and teaching particularly in urban areas where there is scarcity of elderly people. In a study with Metis elders, Iseke and Desmoulins (2015) observed that elders played a role of teaching the youths lessons related to spirituality, practical skills, history and storytelling, which are key attributes to indigenous education. Ngcoza (2018), reported a situation where a Xhosa elder is invited to Rhodes University to teach a science class on how to brew traditional beer called *umqombothi.* Similarly, elders in Manicaland could be invited to teach IK concepts related to weather and climate to a Geography class in secondary schools.

5.5.2 Challenges emerging from community elders

The challenge discussed in this section that emanated from the community elders is the role of Government policy on the rights of children.

5.5.2.1 Government Policy

In the current study, the community elders, CIBUH2 and CFGMUTA1 concurred that government policies on child rights posed a challenge to the integration and teaching of IK in the Geography lessons of weather and climate. The elders perceive children's human rights as a challenge to IK integration since some of the indigenous practices are regarded as abuse if integrated in the Geography curriculum. The findings are similar to the study done by Khupe (2014) among the Mqatsheni community in South Africa. She observed that parents constantly made reference to the need for their children to be respectful to the elders. In this study, the elders blamed Government policies on child rights as a cause for cultural decadence.

The emphasis of the elders is education embedded with *unhu/ubuntu* values. The parents and the children see IK through different lenses. What the children regard as modern culture is seen by the community elders as a breach of their indigenous practices. In a study of *ubuntu* in North Pretoria Gumbo (2014) revealed that tribal authority (Chiefs) that upholds *ubuntu* values, has

shifted to politicians as the community wanted to be looked after by these Politicians. This power shift to politicians is attributed to the decadence of indigenous values such as respect. The Community elders' expectations from their children in Manicaland are consistent with the *unhu/ubuntu* values outlined in my theoretical framework of *ubuntu*. *Ubuntu* is characterized by one showing acceptable behavior such as "respect for elders, honesty, humbleness, helpful and generous" (Lefa, 2015, p. 8). The issue on the disintegration of indigenous values in Zimbabwe was observed by Nziramasanga Commission of Inquiry into Education that emhasised the need for *ubuntu* values to be incorporated in the education system of Zimbabwe (Government of Zimbabwe, 1999).

These different world views on what is perceived as indigenous education is contested terrain as to what should be integrated and taught in weather and climate studies. It is a dilemma on what exactly constitutes knowledge to be integrated in the Geography syllabus but the silver lining is that what elders and the community have revealed as valuable IK should be included.

However, the community was also quick to mention that some of the government policies on child rights are positive and deserve to find a place in the Geography curriculum. The elders supported those child rights against early marriages and excessive beating of children as a form of discipline.

5.5.3 Challenges emerging from teachers and education officials

The section discusses IK integration challenges that emerged from the teachers and education officials. The challenges include local language and teacher related challenges.

5.5.3.1 Local language and Ethnicity

FGD with teachers, observed that, variations in the content of IK textbooks written by authors from different dialect groups was another challenge to the integration and teaching of IK in secondary schools. For example, a textbook written by a *Kalanga* author may differ with the one written by a *Ndau* author on expressing even the same IK concept. In Manicaland there are four main *Shona* dialects which are spoken in the province namely *Ndau, Manyika, Chidyindwi* and *Chihere*. There are some variations in the dialects. Different terms meaning the same thing can be used to explain IK concepts on weather and climate for example a common rain bird used to predict rain is known by different terms such as *haya or dzvotsvotsvo or koriro* in

different dialects within the same province of Manicaland. Learners therefore may not comprehend some IK concepts in textbooks written in a different language. Kaya and Lyana (2014) and Lukong (2016) observed that, learners were able to understand concepts expressed in the local language. It therefore becomes a challenge to the learner if textbooks are written in a language the learner is not familiar with in his/er daily life.

5.5.3.2 Teachers

The challenges of IK integration discussed in this section under teachers include assessment, a lack of documented learning resources, a lack of training by teachers and teachers' prior experiences.

5.5.3.2.1 Assessment Challenges

TFGCHIM2 and TFGBHU3 viewed dialectical differences spoken across Manicaland as a challenge during assessments of Geography concepts in the secondary schools. In the same province of Manicaland for example, the rain making ceremony is referred to as *musoso, makoto* or *mukwerere.* The variations used to describe the same aspect of weather poses a challenge to the markers who may not be familiar with the dialect used by the learner. Lukong (2016) observed that, learners comprehend concepts better if they are expressed in the local language.

In order to overcome the challenges, the teachers called for standardization of the marking guides for summative examinations that incorporates IK. The teachers recommended team writing of textbooks by authors coming from different background and experiences.

5.5.3.3.2 Lack of documented indigenous learning resources

Teachers, TIMUTA1 and TICHIP1 and MPGI agreed that, lack of documented resources was a major challenge to the integration and teaching of IK in the Geography lessons of weather and climate. The shortage of learning materials was found as an impediment to the full implementation of indigenous technology and culture in South Africa (Vandeleur, 2010). The teachers who were involved in Vandeleur study lacked confidence in teaching indigenous technology as they lacked any form of qualification in IK. In a similar study by Seehawer

(2018) with Science teachers in South Africa on the integration of IK in Science, teachers complained that, they were having some challenges in integrating IK in the Science lessons due to inadequate training in IK during teacher training as well as inadequate IK resource teaching materials available to them. In this study, it was observed that, teachers are not fully knowledgeable on what to teach about IK in the secondary schools due to a lack of documented sources which they could refer to for content. The teachers need documented sources to refer to for scheming, planning and preparation of teaching notes. Le Grange and Ontong (2018), in their evaluation of Curriculum 2005 and the Curriculum Assessment and Policy Statement (CAPS) in South Africa also revealed that, curriculum reform in Geography was hampered by lack of resources such as books on IK. In Zimbabwe, available books that are currently being used in schools have been largely imported from Britain and portray a British culture as illustrated in findings by Shizha (2006) and Mavhunga (2006).

There are limited available textbooks on IK which makes it a challenge for the teachers to plan and prepare notes for teaching. TIMUT1, in an interview further emphasised that the challenge with IK integration was that oral information lacks consistency and coherence. The challenge of textbook shortages in IK is worsened by the fact that, IK is orally transmitted and some of the information can be lost during transmission (Jekede, 1999). The lack of IK resources for use in integrating IK was also observed in a research carried out at North West University (Mmola, 2010) and in the Western Canadian schools (Graham & Ireland, 2008). In a related study on IK integration with WS, Guilherme and Hüttner (2015), found that, indigenous Brazilian schools were still facing shortage of infrastructure in terms of classrooms, IK libraries and internet services. The integration of IK in the school curriculum in Zimbabwe is a relatively new phenomenon. There are still very limited documented text books on IK for use in the schools. The libraries are not adequately equipped with textbooks on IK.

5.5.3.2.3 Lack of training by teachers in IK

Some teachers were not prepared to integrate IK in the teaching of weather and climate in the Geography lessons in secondary schools because they fear an extra workload in researching information since they lacked training in indigenous knowledge. Le Grange and Ontong (2018) in a study of IK integration in Geography, found that, lack of training by teachers hampered the integration of IK. TFGCHIP4 believed that, some teachers were not prepared incorporate

knowledge different from their usual teaching content and change their methodology as they incorporate IK concepts in the teaching of weather and climate. Similarly, in South Africa, Vandeleur (2010) found that, the lack of a qualification in IK by teachers hampered the teaching of indigenous technology and culture as the teachers lacked the confidence to teach the subject matter and they also did not know how to teach it.

However, MPGI gave a counter argument regarding lack of trained teachers. MPGI argued that teachers were not only trained to teach a particular syllabus. According to MPGI teachers should read and understand the new ideas of IK to be integrated in the teaching of weather and climate, meaning that they should upskill. The MPGI therefore does not view a lack of training of teachers as a hindrance to the integration and teaching of indigenous knowledge. In concurrence with the views by the MPGI, Dreyer (2018) found that, teachers must be able to adjust their teaching in accordance to changing learning environment. The findings contradict with views expressed by Gatawa (1998) who attributed the failure of Zimbabwe Science (ZimScience) due to a lack of trained teachers. The shortage of human resources has been emhasised by Mmola (2010) in his study at North West University. He noted that, a shortage of teaching staff in IK was a hindrance to integration of IK in the classes. Further, Kanu (2005) weighed in by observing that untrained teachers in cultural practices were unprepared and lacked confidence to teach IK in the classroom. In another study in Malawi, Phiri (2008) echoed the findings by observing that teachers lacked the local terminology that can be used to describe WS concepts. Teachers' unpreparedness and lack of training were an obstacle to IK integration as has been echoed by other researchers (Battiste & Henderson, 2002) elsewhere.

Although documented resources are important for the teachers to do their schemes, plan and prepare notes, this could be just a temporary impediment in the initial stages of integrating IK as teachers can be trained by the Ministry or self/ cluster trained. Teachers can access the internet and download relevant IK content for use in the classroom. The teachers can also share IK in their clusters for use in the classroom through various social media.

The views by the teachers suggest that for any integration of IK in the teaching of weather and climate there is a need for in-service training of the teachers and other educational stakeholders

in indigenous education. The teachers need to be equipped with the content knowledge on IK as well as indigenous teaching methodologies.

5.5.3.2.4 Teachers' prior experience and background

FGD with teachers revealed that, teachers' prior experiences and background on IK can either instill a positive or negative attitude toward integrating and teaching IK in the study of weather and climate in Geography in the secondary schools. Teachers who were negative with indigenous practices were not prepared to integrate IK in their teaching. Vandeleur (2010) in the study of the South African indigenous technology and culture curriculum, observed that teachers who had a westernised background had a challenge in teaching IK as there were no adequate resources to refer to. Further, the study by Vandeleur revealed that teachers concentrated in teaching those areas they had prior experience in for example a Geography teacher would focus on the environment. More so, teachers lacked training in indigenous technology hence they did not have confidence in teaching the new curriculum (Vandeleur, 2010). The findings from this study are further collaborated by Seehawer (2018) study on IK integration by Science teachers in South Africa. Science teachers who grew up in rural settings where IK was practiced were and cherished were more knowledgeable on IK content to teach and had more interest to teach IK than those teachers who grew up in urban settings (Seehawer, 2018).

In the FGD, TFGCHIP1and TFGMUT1 strongly believed that, elderly teachers who used to witness some rains after their elders performed indigenous practices such as *mukwerere* (rain making ceremonies) or appeasement of the spirit mediums are more likely to integrate and teach IK in the Geography lessons than the younger generation of teachers who never experienced such practices. Findings presented by Mclaughlin and Whatman (2015) in the study of the Aborigines in Australia noted that urban teachers who did not have connections with Aborigines found it difficult to integrate IK in the classroom. They made the observations that teachers in the rural areas found it easier to integrate IK since they regularly built relationships with the Aborigine community (Mclaughlin & Whatman, 2015)

5.6 Conclusion

The chapter discussed the findings in parts as guided by the research questions. Part 1, discussed the codes utilized in the study and the characteristics of the participants. Part 2, focused on the discussion of the findings that were answering research question 1. The conceptions of the teachers and community elders regarding decolonisation and the integration of IK in the teaching of weather and climate in secondary schools were discussed. Part 3, addressed research question 2, on how IK could feature in the teaching of weather and climate in Geography. It was discussed that, there are several pathways in which IK could be integrated in the teaching of weather and climate. These pathways include infusing IK in the lesson introduction and development; teaching IK as a separate module and inviting community experts into the Geography classroom as guest teachers. It was further discussed that IK could feature in the Geography syllabus through the use of the local language/s to explain Geographical concepts. IK could further feature in the Geography syllabus through integrating indigenous ways of weather forecasting and adding the role of spirituality in influencing weather patterns. Finally, part 4 of the chapter discussed research question 3 on the possible challenges that may hamper the teaching of IK in the Geography class. It was discussed that government policies, pedagogical, religious and technological advancements can influence the teaching of IK in the Geography lessons on weather and climate in secondary schools.

CHAPTER 6: MORE THEORY BUILDING

6.1 Introduction

In the previous chapter 5, the findings from the study were discussed in relation to the three research questions and existing literature with some theoretical insights. Chapter 6 presents further insights of the study emerging from the research findings. The insights are based on the following three research questions:

1. What are the teachers and community elders' conceptions on the decolonisation of the Geography curriculum and the integration of indigenous knowledge in the teaching of weather and climate in the secondary schools?
2. How can indigenous knowledge feature in the teaching of the topic on weather and climate in Geography in the secondary schools?
3. What could be the possible challenges of integrating indigenous knowledge in the teaching of weather and climate in Geography in the secondary schools?

6.2 Pathways of Indigenising the Geography curriculum

The research established that, there are several pathways in which IK can be integrated in order to have an indigenised Geography curriculum in secondary schools. These pathways are discussed in this section.

6.2.1 Community engagement limited by insufficient IK expertise

It emerged from interviews and FGD with both teachers and community elders that, IK can feature through community engagement. In this study community engagement means that, the community is involved in contributing to the knowledge acquired in the schools. The community work together with teachers and learners in contributing to IK. The indigenous experts are guest teachers in the classroom where as the teachers and learners research IK from the communities surrounding the schools. Dreyer (2018) argues that, teachers should make use of the environment around the school to teach Geography concepts. The community indigenous experts are engaged in teaching indigenous practices such as cultural values of *unhu/ubuntu,* local language use of geographical terms, rainmaking ceremonies and indigenous ways of weather forecasting. The elders could be invited at the school as resource persons. The teachers and learners can also research from the community indigenous aspects related to the study of

weather and climate. In a study with science teachers in South Africa, Seehawer (2018) observed that, indigenous experts were invited to teach IK in the classroom. In this study, MPCDO recognized elders' experience as acquired knowledge which was equated to qualifications obtained in institutions of higher learning. The involvement of the community was viewed by the educational manager as a way of strengthening relationship between teachers and the community. The study correlates with the findings which were carried out in Western Canada by Graham & Ireland (2008), in which the community elders were invited to the schools to teach the culture, history and traditions of the indigenous people. The learners could also in turn carry out field visits in the community to research more on indigenous practices. The finding is in line with Ogunniyi & Ogawa (2008) who observed that IK should involve field work in the surroundings. Indigenous education is therefore practical oriented as viewed by Khupe (2014) in the Mqatsheni study in South Africa. The challenge is however that the elders are becoming fewer particularly in urban areas where the elderly population often retires to the rural areas. Further, the involvement of community elders and teachers in the construction of knowledge to teach Geography classes, is in line with the social constructivism theoretical framework adopted in the study.

6.2.2 Infusing IK in the Geography curriculum-some meaningful integration

Teachers believed that, IK can be infused with the current Eurocentric Geography curriculum in the teaching of weather and climate in Geography in secondary schools. The teachers believed that, common aspects of IK and WS could be infused and taught together for example the classification of rainfall types. The WS classifies rainfall type according to formation. On the other hand, it was found that, the indigenous people of Manicaland in Zimbabwe classified rainfall types according to function the rain perform, nature of rainfall and period in which the rain occurs. Such common aspects of rainfall classification could be taught together during the lesson(s) on rainfall types. Naidoo &Vithal (2014) and Diwu & Ogunnyi (2012) regarded the infusion of the common aspects of the two forms of knowledge as integrationist approach. In a study of agricultural college curriculum in Zimbabwe, Ndlovu (2019) suggested infusing IK with WS in order to indigenise the agricultural college curriculum. This study argues for integrationist approach as argued by Naidoo & Vithal (2014) and Diwu & Ogunnyi (2012). The integrationist approach allows for the infusion of appropriate knowledge from the two epistemologies (IK and WS). It also acknowledges that IK and WS are equal forms of knowledge which can be used in the teaching of Geography in the secondary schools.

6.3 Integration of IK promotes national heritage

It was found that, the integration of IK in the teaching of weather and climate promotes Zimbabwean national heritage. The research participants were in agreement that national identity, cultural practices in form of local language usage, rain making ceremonies and the teaching of *unhu/ubuntu* values could be promoted through integrating IK in the Geography lessons on weather and climate.

6.3.1 Integrating IK in Geography promotes national identity

The study established that the inclusion of IK in the Geography syllabus promotes national identity. The community elders and teachers equated the teaching of indigenous practices to national identity. The community elders and the educational practitioners viewed the teaching of indigenous practices in the secondary school classrooms as one way in which a nation can identify itself from lessons elsewhere. The participants felt that their children are being exposed to an alien culture such as a foreign language and dressing code. They strongly believed that their children should know that they are African people; they are Africans with their own indigenous practices. They felt this could only be achieved by integrating IK in the teaching of Geography lessons.

It emerged from the interviews and FGD with the community elders that, authentic education is one that portrays Zimbabwean national identity. According to the community elders, authentic education is manifested through integration and use of dominant *Shona* language in the teaching of Geography in secondary schools. The use of local language in teaching Geography was viewed as one way of decolonising the Geography curriculum and identifying Zimbabwe's national identity. Zimbabweans have their own local language which identifies them as a nation. There is proud in the use of local language in teaching as it links oneself to the origin of a nation. The elders purport that a country is identified by its culture and local language use permeating through the school curriculum such as the Geography syllabus. The participants are arguing for a post-colonialist perspective to Geography education that fights the domince of Western education in the school curriculum.

Authentic education is one that teaches *unhu* values, indigenous traditions and history of the local people. For the community elders, education should build a complete person endowed with both academic and indigenous values such as respect, love and royalty. Education should therefore teach practical skills that do not only help the individual but the whole community. According to Dreyer (2018) authentic Geography education should put into consideration the values of different groups of the learners.The community thrust to promote national identity amongst the learners in the secondary schools is in line with the Ministry of Primary and Secondary Education Curriculum Framework For Primary and Secondary Education (MPSECF, 2015-2020).The curriculum framework, in one of its aims (item 1.6.1) states that "The new curriculum is to promote and cherish the Zimbabwean identity in particular patriotism, awareness of heritage, history and traditions and *ubuntu*" (Government of Zimbabwe, 2015, p. 6).The teachers and elders felt that African culture has been eroded by the Western culture hence there is need to restore this Africanism through decolonizing the curriculum by integrating IK in the teaching of weather and climate in the secondary schools.

Authentic education, according to the community indigenous experts is one that decolonise the Geography curriculum through teaching indigenous practices such as rain making ceremonies. The indigenous people of Manicaland have strong belief in the spirituality. They believed the ancestral spirits cause events to occur such as rainfall or drought. The elders believed that, spirit mediums can predict weather and seasonal patterns. Therefore, according to the elders, IK is part of the spiritual world. By teaching spirituality in the indigenised curriculum Zimbabwean national identity is defined and acknowledged. More so, including IK in the indigenised curriculum would add a spiritual dimension in the syllabus.

For the community elders, integration of IK in the teaching of weather and climate in Geography go beyond teaching Geography content alone. They believed that Zimbabwean' identity should be reflected through the teaching methodology that resonates with indigenous practices. Dreyer (2018) observed that, authentic Geography education should make use of the learner's environment and indigenous methods including practical work, group work and active learning. It was established from the research that the participants were supportive of introducing traditional methods of teaching such as songs and storytelling relevant to the topic to be taught in the classroom. Hewson (2012) in the studies carried out in Lesotho observed that the community wanted IK methods of storytelling and field work to be practiced in the

schools. Thus, there is a pedagogy for indigenising the curriculum that was being advanced by the participants and this comprised of songs, storytelling and practical activities that prepares the learner with survival skills in future. In addition to having IK experts from the community as guest teachers infusing their indigenous practices into the Geography lessons.

The community elders viewed the integration of IK in the teaching of weather and climate as a pathway of re-introducing the role of community elders in the teaching of children in the community. Mapara (2009) observed amongst the Tangwena community in Nyanga, Zimbabwe that the community elders played a major role in educating the children in terms of providing an indigenous education and cultural practices. The community elders in this current study were prepared to teach indigenous practices in the schools if the opportunity is availed to them.

The community elders viewed national identity as education that acknowledges the indigenous different forms of knowledge such as indigenous ways of weather forecasting and the role of spirit mediums. This IK, the elders believed should be transmitted to the children through indigenizing the Geography curriculum. Thus, they viewed national identity in terms of IK their children must acquire in the schools. The participants viewed the integration and teaching of IK as a panacea to decolonising the Geography curriculum.

6.3.2 Towards authentic education: Indigenous knowledge is national cultural infusion

The community elders view IK integration into the Geography curriculum and teaching in the schools as a way of restoring their Zimbabwean indigenous practices. The elders wanted their children to be taught practical education that is gender specific. The community elders in the interviews and FGD revealed that, culturally, the boys were taught education related to manhood and the girl child was taught womanhood roles, distinctively gender specific roles. Boys for example, were taught roles such as hunting, farming and fighting at a special place they called *banza*. Family elders such as grandfathers and uncles were responsible for tutoring the boys. The girls were tutored domestic chores such as thrashing millet and looking after the family. Teaching through family gatherings by family or community elders is contrary to Western education and values. By including the role of elders in teaching children in schools,

this would add community involvement dimension in the teaching of indigenised Geography curriculum. Teachers, community elders and learners are therefore involved in the construction of knowledge imparted to the learners.

All children were also taught *unhu/ubuntu* values. The community elders' perspective is in concurrence with Shizha (2014) who advocated for the African child to learn his/her own culture and traditions before they learn foreign cultures. These cultural values consist of respect, honesty and love (Lefa, 2015). The community elders therefore suggest that, integration of IK in the teaching of weather and climate in Geography should incorporate the teaching of cultural values. The elders believed that they are identified as people because of their cultural beliefs. An authentic Geography syllabus according to the elders should therefore teach practical education that prepares the learners for adult roles and survival skills. Geography education should therefore be practical oriented and meet the needs of the community. More so, Geography education should build a total person with both academic and *unhu* values acceptable by the community.

The Nziramasanga Commission of Inquiry into Education and Training (Government of Zimbabwe, 1999) supports the need to teach cultural values in the education system. The elders were however quick to point out that other cultural values that involve child abuse must be abandoned. The community elders' views suggested that they are not particularly against Eurocentric education wholly. They believed that some Eurocentric forms of education taught in schools such as those against child sexual abuse and early marriages are good. The elders proposed the integration of IK that is of value to the community to find its way into the Geography lessons.

The concern by community elders was that of restoring their lost cultural practices. The elders felt that Christianity, technological developments and Government policy have contributed to the loss of their culture. The elders further condemned the coming of the Missionaries into Zimbabwe as contributing to the loss of cultural practices. The elders perceived that, the Missionary activities regarded their indigenous practices such as rainmaking ceremonies and use of indigenous medicine as heathen. The view by the community elder's correlates well with

Nyati (2001) who found that, those missionary activities despised African traditions and regarded them as evil. The Nziramasanga commission of inquiry into education in its findings noted that students' delinquency contributed to an education system that lacked *ubuntu* values such as respect, love and sharing with one another (Government of Zimbabwe, 1999). There was therefore a need to restore these values through the integration of IK in the education system

The elders perceived the introduction of media technology such as radio and television was an impediment to IK integration and teaching. They believed so because family elders provided indigenous education to the family during the evening around a fire place. However, with the introduction of technology children spent most of their time viewing television, radio or using internet services. This deprived the elders' time to educate their children on indigenous practices.

More so the families have been segmented due to formal employment and urbanisation. The elders therefore appreciated the inclusion of IK in the teaching of weather and climate as a way of reviving their cultural values. The elders now see as a fresh opportunity of instilling their cultural beliefs into their children. It was observed that the elders were willing to be invited to the school to teach their history, traditions and cultural values hence it was possible to integrate IK in the teaching of weather and climate studies in Geography in the secondary schools.

6.4 The integration of IK promotes effective pedagogical practices

Pedagogical practices in this research are activities that facilitate teaching in the secondary schools. This includes the ways in which knowledge is constructed as well as the methods used to convey that knowledge to the recipients.

6.4.1 Community engagement promotes co -construction of Knowledge

The research established that incorporation of IK in the teaching of Geography in the secondary schools promotes effective pedagogical practices and construction of new knowledge. The findings from the teachers established that the use of IK in teaching make use of the learners' prior background and experiences. The learners interact with their communities through research on assigned tasks from the teachers. It was revealed that learners can research indigenous aspects related to weather and climate from the local community. The learners

discover new knowledge which they supplement information they obtain from the teachers. The teachers make use of the prior knowledge of the learners to develop the lessons. Khupe (2014) observed that IK constitute indigenous learners' prior knowledge which should be made use of to enhance comprehension on learning concepts.

The study established that community elders were a bank of IK in the community. They share their knowledge with teachers as well as the learners. The elders provided information to the learners on the cultural practices, history and traditions that included rain making ceremonies. Mpofu et al, (2014 found that elders were a source of wisdom, knowledge and experience in their communities. In Zimbabwe community elders have always contributed to knowledge especially in rural settings. The community often gathers at a place around a fireplace in the evening. The people could bring in their food and share. The family elders such as uncles and grandfathers educated the young boys on life skills and manhood roles. Education would take place in the form of riddles, songs and lectures on life experiences. Mapara (2009) earlier noted that the aunts and grandmothers educated the girl child on some household duties and roles associated with womanhood. The children contributed through singing and asking the elders related questions. There was a sharing of knowledge between the teacher, the student and the community. The school and the community contribute to the generation of knowledge.

The community appreciated the role of education as they would also get involved in the learning process, hence co construction of knowledge. Integration of IK in the teaching of Geography was viewed as a process that enhances community cohesiveness. The community elders and teachers work as a single entity to achieve an educational goal. The engagement of the community in the learning process of their children was viewed as something that brings a sense of ownership of the education system by the community. The parents expressed their willingness to support the educational programmes at the school through proving their knowledge as resource persons on indigenous practices. This could result in the further development of the school in terms of infrastructure, material support and disciplinary issues.

The current situation in Zimbabwe is that the community is involved in the development of the school through school development committees whose main function is to provide financial and material resources. At present the community elders have a limited role in the provision of knowledge on indigenous practices in the schools mainly because there is limited content on IK to teach in the schools. The community elders therefore viewed the integration of IK in the

Geography lessons as a process that increases their engagement in the education of their children.

6.4.2 Integration of IK facilitates learner-centred approaches

The study revealed that the use of IK promotes learner centred methods of teaching. The teachers revealed that they would maximize the use of local examples with the integration of IK in the Geography curriculum. The teachers pointed out that IK integration allows some learners to use local language terms to explain geographical concepts. The teachers expressed that learners were able to explain their views more fluently in their local dialect. Similar findings were observed by Dennis (2010) in the Canadian schools.

The teachers in the present study, believed that Geography lessons in which IK is integrated were more interesting and livelier, a view supported by Kaya and Lyana (2014). The teachers believed that the use of local examples is very important in Geography especially in the teaching of weather and climate where abstract concepts are common. The teachers felt that the use of local examples improves comprehension of abstract ideas in the study of meteorology. The teachers' views were that, the use of IK allows lessons to develop from known to unknown, thereby improving their comprehension of meteorological concepts. The teachers concurred that the use of local terminology to describe geographical concepts enhances an understanding of geographical knowledge. The view by the teachers correlates with Shizha (2014) who observed that learning became child centred in cases where IK was integrated in the lessons. Zimbabwe inherited the British education system where lessons are conducted through the medium of English. The Geography books used in the secondary schools are also written in English. For the indigenous people, English is a second language. Learners find it difficult to comprehend concepts articulated in English especially for the weaker students. However, if the students express themselves in a familiar dialect, the learners become more involved and will participate in the lessons.

The use of IK in the lessons appreciates the contribution from each learner. Students from different cultural backgrounds are given an opportunity to contribute and share their ideas. Although teachers acknowledged that, in a multicultural class it was difficult to determine

whose culture to teach, they concurred that, learners coming from different backgrounds can share more ideas on IK thereby enriching the lesson content. Dreyer (2018), observed that, a class with learners coming from different background promotes an interactive pedagogy. The views by the teachers confirm multicultural theory which recognizes and respects the diversity of values and cultural beliefs of different groups of people in a society.

Multicultural theory gives importance to learners coming from diversified cultural backgrounds. It calls for equality among the learners and fight against discrimination of learners coming from disadvantaged communities (Kymlick, 2012). The findings from the teachers established that participatory methods of teaching are enhanced through the use of indigenous practices. Teachers pointed out that they would use traditional songs related to the geographical concept under study in their lessons. The teachers were of the view that the use of these songs enhances student participation and excitement in the Geography lessons. Mosweunyane (2013) reiterated the findings by acknowledging that indigenous education was conducted in form of songs, stories and riddles.

The teachers revealed that they would provide tasks to the learners to research geographical concepts such as the ways of forecasting weather and local geographical terms to describe Geography concepts. The teachers therefore viewed the integration of IK in the teaching of Geography as a positive move that can develop research skills amongst the learners. Students are given an opportunity to discover new knowledge as they venture out to research. Mahlatsi (2017) observed that the integration of IK in teaching allowed learners to go into the field and generate research materials by engaging the community. Teachers also suggested that learners write a project on a selected topic on weather and climate. This can be done for any geographical topic but the essence is that skills of research, such as observation, data presentation analytical skills will be developed.

6.5 Indigenous language usage in teaching Geography concepts

Indigenising the Geography curriculum by including and teaching geographical concepts in the local language promotes understanding and comprehension of geographical concepts in the study of weather and climate in the secondary schools. The current Geography syllabus in the secondary schools is Eurocentric whereby the medium of instruction is English. Learners are

expected to express themselves in English as well as writing their examinations in the English language which is foreign to the learners. Kaya and Lyana (2014) and Lukong (2016) found that, learners were able to express themselves in their local language and this promotes comprehension of ideas. The community elders and teachers came up with several indigenous geographical terms that could be integrated and used in the teaching of the topic on weather and climate in Geography. It was established from the interviews and FGD with both teachers and community elders that, the indigenous people have local terms they use to describe different types of cloud types. The teachers believed that some of the learners are familiar with the types of clouds in the local language but more than often the teachers just describe them as cumulus resulting in the learners failing to grasp the concept. The teachers therefore felt that the integration of local language terms in the teaching of Geography promotes understanding and comprehension of geography concepts amongst the learners. The views by the teachers confirm Khupe (2014) studies in South Africa who observed that understanding of science in the classroom improved as teachers integrated IK in their teaching. It is common that teachers talk of warm fronts which would appear as something alien to them yet if they use the term *denderedzwa redziva remvura* (referring to sun/moon halo) and *ruseto* (cirrus), the learners can understand understand better as the learners are familiar with such terms from their home backgrounds.

There is a point of convergence in the way IK and the Geography textbooks choose theterms to describe different types of clouds. For example, Geography textbooks classify cumulus clouds as heaped or has vertical extension in appearance (Waugh, 2009). Similarly, in the Shona language the term *mvumi* (cumulus) describes something that rises above the sky. The use of indigenous language in teaching Geography therefore adds another element of local language dimension in the syllabus which is absent in the existing Eurocentric Geography syllabus.

The different types of rainfall that emerged from the interviews and FGD with teachers and community elders if included in the current Eurocentric Geography syllabus would bring in a new dimension of rainfall classification and more types of rainfall in the indigenised Geography curriculum. The new rainfall types that were mentioned by the participants include *bumharutsva, gukurahundi and mavhurachando*. These rainfall types are classified according

to the time the rainfall type occur and the function performed by the rainfall type. For example, *mavhurachando* is rainfall type that occurs at the onset of the cold winter season (classification by time of occurrence). On the other hand, *Gukurahundi* is heavy downpour that washes away chaff after thrashing millet (classification by function). The Eurocentric syllabus has three types of rainfall namely conventional, cyclonic and relief. Their classification is based on how the rainfall forms (classification by formation)

It also emerged from the interviews and FGD with community elders that, there are local winds namely, *nhuruka*, *mhepo yekumabvazuwa* which affect Manicaland areas. These local winds are not included in the current Eurocentric Geography syllabus. Indigenising the Geography curriculum by studying local winds using local language would enhance understanding of airmasses by the Geography learners in the new indigenised Geography curriculum. Including the study of local winds in the indigenised Geography curriculum would enrich the content of airmasses studied in the secondary school's Geography. The local winds are used to predict weather in Manicaland. The inclusion of these local winds therefore improves weather forecasting at a local scale. The current Eurocentric syllabus focus on regional airmasses such as North East and South East trade winds which affect broad regions.

The significance of these air masses and other weather elements are important in the teaching of Geography. The indigenous understanding of these weather elements if brought into the class room allow greater integration of IK as well as enhancing comprehension of meteorological concepts as viewed by Mmola (2010) and Khupe (2014). The learners are aware of these weather elements from their home backgrounds as they interact with their elders. They bring to the classroom this prior knowledge. There is need to link this prior knowledge of the learners to the new knowledge they are to acquire in the classroom context. If the teacher fails to link this prior knowledge to new knowledge, learning is unlikely to take place.

6.6 Indigenising the curriculum: cultural practices embedded in the spiritual world

Interviews and FGD with community elders strongly believed that cultural practices such as rain making ceremonies (*mukerere/musoso/zvitsanza*) and the role of ancestral spirits should be integrated in the indigenised Geography curriculum. Indigenising the Geography curriculum

by including cultural practices extends the curriculum into having a spiritual dimension. The current Geography syllabus consists of Human and Physical Geography, Geographical Information System (GIS) and mapwork. It also comprises of cross cutting issues such as climate change, disaster risk management, HIV and AIDS. The Eurocentric Geography. With the Eurocentric Geography explanation of phenomena such as rain formation is through set out principles such as theories, experimentation and facts (Mawere, 2015). In the new decolonised curriculum, the spiritual element becomes significant. There is an additional spirituality aspect where phenomena like rainfall formation is attributed to the Ancestral spirits and rain making ceremonies. The learners have got some experiences on rain making ceremonies and how they impact upon rain formation. The teachers should therefore integrate the learners' experiences and background in the teaching of weather and climate in Geography in the secondary schools in order to construct a cultural bridge between home experience and the school. Hatcher, Barlett, Marshall &Marshall (2009) argued for a cultural bridge in which the strengths of both IK and Western science are taken onboard to assist the learners.

6.7 The Environment is a weather station for indigenous weather forecasting

The study established that the indigenous people make use of the biological and physical environment as their weather stations to forecast weather and seasonal patterns. The biological environment consists of plants, animals, birds and insects. The physical environment is made up of the sun, the moon, stars, rainbow, patterns of air masses and cloud types.

6.7.1 The biological environment as a weather station

The physical and biological environment is used by indigenous experts in Manicaland to measure weather elements and forecast weather and seasonal patterns. Barnhardt and Kawagley (2005) has shown that the indigenous people managed to predict weather through observation of their environment. The Eurocentric Geography syllabus emphasis the teaching of weather forecasting based on the recordings from the weather station. The weather station consists of instruments to measure weather such as thermometers to measure temperature; hygrometer for measuring the amount of humidity in the atmosphere; rain gauge to measure rainfall amount; evaporation dish to determine loss of moisture into the atmosphere; wind vane to identify wind direction and cup anemometer to record wind speed. The indigenous methods of weather forecasting can be used to measure or record aspects of weather elements similarly

recorded by Westernised weather stations as represented in the current Eurocentric Geography syllabus.

It emerged from interviews and FGD with teachers and community elders that, plants undergo physiological changes that are used by the local people to predict weather patterns. The shedding and sprouting of trees such as *mnondo* and *msasa* were most evident in the study. It was agreeable by all those interviewed that shedding of leaves indicates a pending dry and windy season whereas the sprouting of the trees signifies the start of the summer season. The shedding of leaves could be used as a measurement for high evaporation rates resulting in the plants drying off and shed off leaves. The WS would use an evaporation dish to measure evaporation. As it becomes very hot the plants shed off leaves in order to reduce the rate of transpiration. The first rains and excessive heat initiates capillary action and provides moisture for plants to sprout during the start of the summer season. For the indigenous weather experts, the sprouting of plants is a result of high soil moisture content and high humidity in the atmosphere. Rosenzweig and Neofotis (2013) attributes changes in plant morphology as a result of changes in meteorological elements such as moisture and temperature.

It further emerged from interviews and FGD with both teachers and community elders that, the indigenous people in Manicaland make use of changes in the behavior of birds such as the *haya/dzvotsvotsvo/koriro* (rain bird) and *riti* (stork bird) predict weather patterns. The haya bird squeaks continuously indicating high humidity and pending rains within a short period of time. The weather station on the other hand make use of a hygrometer to measure humidity in the atmosphere. The findings from the elders conforms to the study by Muguti and Maposa (2012) in in the south-eastern parts of Zimbabwe in which they observed that *haya* (rain bird) was frequently used to predict the coming of the rains.

Body injuries and back pains are used to predict pending cloudy, humid and cold weather within a period of one to two weeks (medium weather forecasting). The Eurocentric Geography syllabus on the other hand uses instruments such as hygrometer to measure humidity and temperature to record changes in temperature. The indigenised curriculum therefore would improve weather forecasting if used together with WS weather forecasting. Weather forecasts

become more accurate particularly in Least Developed countries like Zimbabwe where weather stations are scarce and often equipped with poor technology.

Insects are used as a measure of high humidity and pending rain period within a short period of time. It emerged from interviews and FGD with teachers and community elders that, ants collect food into the mound during fine weather conditions and start to seal off the openings once humidity in the atmosphere increases and when it is about to rain. In the modern science as represented in the Westernised Geography syllabus, the hygrometer is used to measure relative humidity in the atmosphere. The indigenised Geography curriculum therefore acknowledges that, the two forms of epistemology (IK and WS) are equal and forms of knowledge that deserves to be taught in the classroom in secondary schools.

Indigenous weather forecasting relies on observation, repetition of events and inference to forecast weather and seasons. Emerging also from the study was that, indigenous plants produce more fruits when there is pending drought. The most cited were *hacha/ chakata* (*Parinari curatellifolia)* and *mazhanje* (Uapaca kirkian). The concept cannot be easily explained as we would expect dry conditions to be associated with low fruit yield. Just like in a science laboratory the elders relied on observation and repetition of an events as suggested by Stephens (2000). The community elders of Manicaland made conclusions on weather patterns after long period of observation and inference. After a long period of observation, the elders associated plenty of fruits with drought conditions. Fewer fruits produced are regarded as a sign of good rains. The local people believed that the ancestors provided them with fruits during periods of drought as long as their relationship with the ancestors is good. The inclusion of IK in the Westernised Geography syllabus therefore add another dimension on the methodology to study weather patterns (observation, repetition of events and inference). Including IK in the Geography syllabus also add a spiritual dimension in weather forecasting. The element of spirituality has not been included in the current Eurocentric Geography syllabus which believes in proving facts and theories.

The insights emerging from the findings from both the elders and the teachers were that the community of Manicaland relies a lot on the use of plants, animals and insects to predict

weather and seasonal patterns. The community had the feeling that the biological and zoological aspects of the environment can be integrated in the Geography curriculum and used as an indigenous weather station to predict weather and seasonal patterns in the local communities.

6.7.2 The physical environment as a weather station

The physical environment could be used to predict weather patterns. Both the community elders and the teachers believed that when the moon is full (*jenaguru*) they do not expect some rains. The first quarter (*mwedzi uchabve kubarwa*) and last quarter (*mwedziwafa/wosvibirwa*) of the moon is associated with the rains. The explanation on how moon phases is reliably used to predict the coming of the rains largely depends on inference and repeated observation over a long period of time. In WS monthly and annual averages of temperatures and rainfall are based on observation and recording of the weather elements over a long period of time and then come up with an average. This means that in both IK and WS there is observation of a phenomena over time as a method of studying weather elements. This justifies the teaching of moon phases as a method of predicting weather.

The size of the moon/sun halo (*dziva remvura*) could be used to predict the amount of rainfall within a period of two weeks. It emerged from interviews and FGD with teachers and community elders that, a bigger size of moon/sun halo was a sign that a lot of rainfall was going to be received within the next two weeks. A small size of moon/sun halo was regarded by the community elders and teachers as a sign of low rainfall to be received in the near future. The current Eurocentric Geography syllabus has sub topics on warm and cold front and weather associated with these phenomena. The moon/sun halo is caused by refraction of minute droplets of ice crystals contained in the cirrus clouds. This refraction causes the circle to develop around the moon or the sun. The community of Vanuata in the Pacific Islands used the appearance of the moon/ sun halo to predict the coming of the rains (Chand et al., 2014). However, the findings from Vanuata differs with this study in that the community of Manicaland further use the size of moon/sun halo to predict the quantity of the rains expected to come within two weeks.

The methods used to predict the occurrence of rainfall gives an insight into the nature of IK against WS. Indigenous science uses the biological and physical environment, observation, repetition of events and inference to predict weather changes. On the other hand, WS relies on the weather station using weather instruments, satellite images and radar to predict weather. IK is therefore qualitative in nature, whereas WS is quantitative. The inclusion of IK in the existing Geography syllabus therefore adds a qualitative dimension as a methodology to study weather and as a way of weather forecasting.

6.7.2.1 Indigenising the Geography curriculum is cultural and linguistic pluralism

Learners have prior experiences on indigenous practices which they bring to the classrooms. The prior experiences by the learners is acquired from their interaction with their parents, community and the environment. The study has established that, the indigenous people of Manicaland have geographical terms and concepts in their local language which they use to describe weather and climate concepts. These geographical terms and concepts include indigenous names of different rainfall types, airmasses and cloud types. These prior experiences that is brought to the classroom by the learners has been referred to by Aikenhead (199, p.: 2) as "cultural border crossing. Ndlovu et al. (2019), observed that learners bring to the classroom knowledge they have acquired from their communities. It has also emerged from the teachers and community elders that, the local people practice rainmaking ceremonies that will result in rainfall. This means that, the learner may understand rain formation as a result of performing rain making ceremonies. This understanding of rain formation may contradict with WS which forms the basis of the Geography syllabus used in secondary schools. Further, in the schools, weather forecasting is produced from weather records obtained from weather stations. On the other hand, the community from which the learners come from predict weather using indigenous experts and spirit mediums. Learners therefore bring to the classroom knowledge on rain formation different from what is taught in the classroom. There is therefore 'cultural and linguistic pluralism' of IK into the classroom. For the learner to understand new Geography concepts taught in the classroom, the teacher should put into consideration this prior knowledge and experiences by the learner. Mawere (2015), found that, including the learners' prior experiences in teaching enhances critical thinking. This study therefore calls for 'cultural integration' whereby the culture acquired by the learner from his/her community is integrated with the Eurocentric Geography syllabus currently in use in secondary schools.

6.8 Religious beliefs influencing teachers' attitudes

It emerged from the community elders and teachers that, religious beliefs can be a hindrance to the integration and teaching of IK in secondary schools. The teacher's attitude as influenced by religious beliefs may determine the implementation of the curriculum. Zimbabwe is composed of people from different religious backgrounds and their views on integration and the teaching of IK vary. If teachers do not take the curriculum as a blue print and choose to integrate IK into their lessons, the intended curriculum comprising of IK may not be realised. Iskander (2015), in a study carried out in Indonesia, observed that, teachers did not implement the curriculum in the classroom the same way with the intended curriculum. Similarly, in Japan, Gorsuch's (2000) found that, the planned curriculum differed with the implemented curriculum in the classroom due to number of factors including the attitude of the teachers on the curriculum. The studies by Iskander (2015) and Gorsuch (2000) shows that, despite the Geography curriculum used in Zimbabwe being prescriptive with clear set out objectives, teachers' attitude as influenced by their religious beliefs would determine how IK would be taught in a Geography class. It emerged from the interviews and FGD with teachers that, those teachers who believed or have experienced African traditional religion were more prepared to introduce IK in their classes. Teachers who were elderly generally believed in cultural practices. The teacher's background and experiences had a bearing on one's appreciation of indigenous knowledge. Teachers who had grown up in rural areas where indigenous practices were carried out appreciated IK integration and teaching in the classroom. It was observed that generally, the young teachers and those who had more urban background without experience on IK were not much prepared to take up IK in their classes. The teachers further believed that Christian related institutions could interfere in the content to be taught in their schools. In Zimbabwe a number of schools are Missionary-run institutions. They have got their vision and mission contrary to traditional practices. The teachers felt there is a challenge in teaching IK in such schools.

The perception on IK practices is therefore depended on past experiences and background. It can be discerned that the past experiences and background by the teacher influences the integration and teaching of IK in the Geography lessons in the secondary schools. Vandeleur (2010) observed in the study of C2005 in South Africa that teachers who were teaching in some

religious institutions had some challenges implementing indigenous technology and culture since they were required to conform to the institution's religion.

Contrary to some of the teachers who did not believe in traditional ceremonies in weather and climate studies, it emerged from interviews and FGD with community elders that, all elders believed in indigenous practices particularly rain making ceremonies. Their views were that, as long as the rain making ceremonies are held properly the ancestors respond by bringing in some rains in due time. This could explain why community elders were willing to become resource persons in schools to teach IK related to weather and climate studies. The elders had experienced their parents performing the ceremonies that culminated in some rains experienced

6.9 Modernization is an impediment to the successful integration and teaching of indigenous knowledge

Aspects of modernization which can be an impediment to the successful integration and teaching of IK will be availed in this section.

6.9.1 Urbanisation hampers IK integration and teaching

The research established that urbanisation is a hindrance to IK integration and teaching in the schools. The community elders and teachers attributed the disintegration of extended families to urbanisation. In the past families of the same lineage or totem would stay together as a big family. It emerged from the interviews and FGD with community elders and teachers that during the evening family members gathered around the fire where elderly family members and community elders taught the youngsters indigenous education. At present family structures have been disintegrated as a result of people who have migrated to urban areas in search of employment and better living standards. The community elders therefore attribute loss of indigenous practices to the disintegration of extended families. In a similar study of the Mqatsheni community in South Africa, Khupe (2014) found that, elders attributed the disintegration of families to loss of indigenous culture and disrespect of the elders. Padmasiri (2018) in Sri Lanka, also observed that IK was having a threat from the dismantling of family structures due to many people residing in urban areas.

For the Manicaland community elders, indigenous education should not be confined to the classroom. To them indigenous education is a sum total of what the students learn from the school and the knowledge their children acquire from their parents and the community. According to the elders in the study area teaching in the classroom should start from the home where the children come from. For the community elders teaching involves the engagement of the community. Studies carried out by Graham & Ireland (2008) in the Canadian schools has confirmed the engagement of the community in imparting indigenous education to the children.

Communal living before disintegration of families as a urbanisation had an advantage in that family members could assist each other during times of need such as war and drought. Family members also helped each other to bring up their children. This role by family elders is no longer undertaken. People have migrated to urban areas in search of employment in the industries (Waugh, 2009). Children and parents are now staying in different localities in rented accommodation. Even if parents have got a large house to accommodate the children, they still prefer to find accommodation somewhere else for the sake of freedom from the parents. The situation worsened by the calling by Government on the age of majority. The acts rather gave freedom to the children to make their own decisions.

The disintegration of families due to urbanisation had an effect on the integration and teaching of IK in the schools in that the children have grown up divorced from the cultural practices of the indigenous people instilled during communal gatherings. The children no longer appreciate their own history, traditions and cultural practices. In the urban areas the children have been exposed to a diversity of cultures. They take IK as something backward and irrelevant. The situation is worsened by the fact that even some of the teachers are within this group of young generation who do not appreciate indigenous knowledge. Mclaughlin & Whatman (2015) in their study of the Aborigines in Australia noted that urban teachers who did not have connections with Aborigines found it difficult to integrate IK in the classroom. The lack of appreciation of IK by the teachers and some parents make it a challenge to integrate IK in the teaching of weather and climate in the secondary schools.

6.9.2 Technological developments are an impediment to indigenous community education

It emerged from the community elders that developments such as radio, television and internet services have disrupted the interaction of the community elders with their children. Gumbo (2014) in a study in Northern Pretoria found that elders no longer have adequate time with their children since children were now spending most of their time internet and social media. The elders in Manicaland claimed that family gatherings around a fire where they use to teach children indigenous education were now a thing of the past since children are spending most of their time viewing the television, listening to the radio or surfing on internet. The elders no longer have time to educate their children on indigenous practices. Family cohesiveness is therefore disrupted by the technological developments.

The elders argued that the children were now detached from the sources of IK who are the parents and community elders. The believed that, children without IK background lack an appreciation of indigenous practices in the classroom. The situation is worsened by some teachers especially the young generation and those teaching in urban areas who do not appreciate the integration and teaching of indigenous knowledge. The lack of appreciation of IK by both the teacher and learner could hamper the integration and teaching of IK in the secondary schools.

6.10 Lack of resources is a hindrance to IK integration and teaching

Resources refers to those things needed for an effective integration and teaching of IK in secondary schools. The research established that lack of resources hampers the integration and teaching of IK related to weather and climate in Geography in secondary schools.

6.10.1 Lack of documented resources as a hindrance to IK integration

It was revealed from interviews and FGD with teachers that, lack of documented resources hampers effective integration and teaching of IK related to weather and climate in Manicaland province. The teachers use textbooks to scheme, plan and make notes for teaching. The text book acts as a guide to the work plan by the teacher. In a similar study, the shortage of learning materials was found as an impediment to the full implementation of indigenous technology and culture in South Africa (Le Grange & Ontong, 2018).

The Ministry of Primary and Secondary Education in Zimbabwe usually provide prescribed textbooks to schools before implementation of a new syllabus. This is done to ensure teachers plan for their work as well as allowing schools to buy prescribed textbooks in time. The new Geography syllabus (2015-2022) lack documented resources in terms of books on IK. Most of the available literature does not make reference to the application of IK in the classroom context particularly for the Geography subject. Shizha (2006) acknowledged that, the available books that are currently being used in schools in Zimbabwe have been largely imported from Britain and portray a British culture. It is now possible to search websites and get relevant literature on IK for use in the classroom. The challenge is however that Zimbabwe just like other least developed countries has serious challenges financially to buy books and teaching materials. The school cannot access these journals due to lack of financial resources and internet services particularly in remote parts of Zimbabwe where the community is largely poor. The community elders can contribute to IK knowledge as they come to schools as resource persons. The challenge indicated by the participants is shortage of these experienced elders particularly in urban areas where the elderly population has retired to their rural homes (Tsindoli, 2019). In cases where the elders are available some have indicated that just like teachers who are paid for their duty, they also need a token of appreciation. This could be a burden to the poor schools. The teachers revealed that the lack of documented resources and financial constraints hinder the effective integration of IK in the teaching of Geography concepts in the secondary schools.

6.10.2 Human resources is an impediment to successful IK integration and teaching

The research established that lack of trained teachers in IK is an impediment in the teaching of IK related to weather and climate studies. The teaching of IK in the classroom is a relatively new phenomenon in Zimbabwe. The study found that, the majority of the teachers who are teaching in the secondary schools have not acquired training in IK. In an FGD with teachers in Chipinge district, where the group was composed of middle aged to elderly teachers, they appreciated IK and willing to teach it in the classroom. Most of them had witnessed IK practices such as rain making ceremonies. Their impediment in integrating IK in the Geography lessons was lack of training in IK during training at teachers' colleges. Seehawer (2018) and Mclaughlin and Whatman (2015) acknowledged that, teachers who grew up in rural settings where IK has been practiced were more willing to teach IK in the classroom. Due to lack of training in IK, the teachers were not confident to teach IK in the Geography lessons. In South

Africa, Seehawer (2018) in a study with science teachers found that, lack of trained teachers hampered the teaching of indigenous technology and culture.

It also emerged from interviews and FGD with teachers that, some teachers were not willing to teach IK content as it involved reading new content, researching and changing the schemes of work they were used to. The research showed that there was a bit of resistance to change by the teachers. However, of interest was the comments given by MPGI during the interviews. MPGI indicated that, there were no teachers trained for a specific period as such teachers were supposed to adjust to the new conditions of teaching indigenous knowledge. MPGI argument was that teachers could not be trained for every change in the syllabus. MPGI was of the view that the teachers can research as well as attending workshops on IK in order to upgrade themselves on indigenous knowledge. Further, some of the teachers who were not knowledgeable on IK proposed that they would invite elders to teach the IK concepts**.**

It also emerged from the interviews and FGD with teachers that, shortage of experts in IK is an impediment in IK integration in secondary schools particularly in urban areas. Community elders are regarded as the custodians of IK who could be invited and teach IK in the schools. Community elders have been invited as guest teachers in institutions of learning for example at Rhodes University (Ngcoza, 2018). The teachers believed that in urban areas some of the elders are no longer in touch with indigenous practices. Further, the elderly population in urban areas have migrated to rural areas on retirement. Some of the elderly people are also dying without documenting their wisdom on IK.

6.11 A Process model for IK integration into the Geography syllabus

From this study, a process model has been developed on the steps that could be taken to decolonise the Geography syllabus by integrating IK into the Geography syllabus. The process model for IK integration (Figure 6.1) illustrates the processes that are involved in integrating IK in the Geography syllabus. Step 1 identifies the problem in the existing subject area (Geography). In the study this involved analysis of the content in the existing Geography syllabus. The analysis serves to identify the content that could be integrated with IK. Areas in the existing syllabus that lacks or contain IK are identified for the purpose of identifying areas that needs integration of IK content.

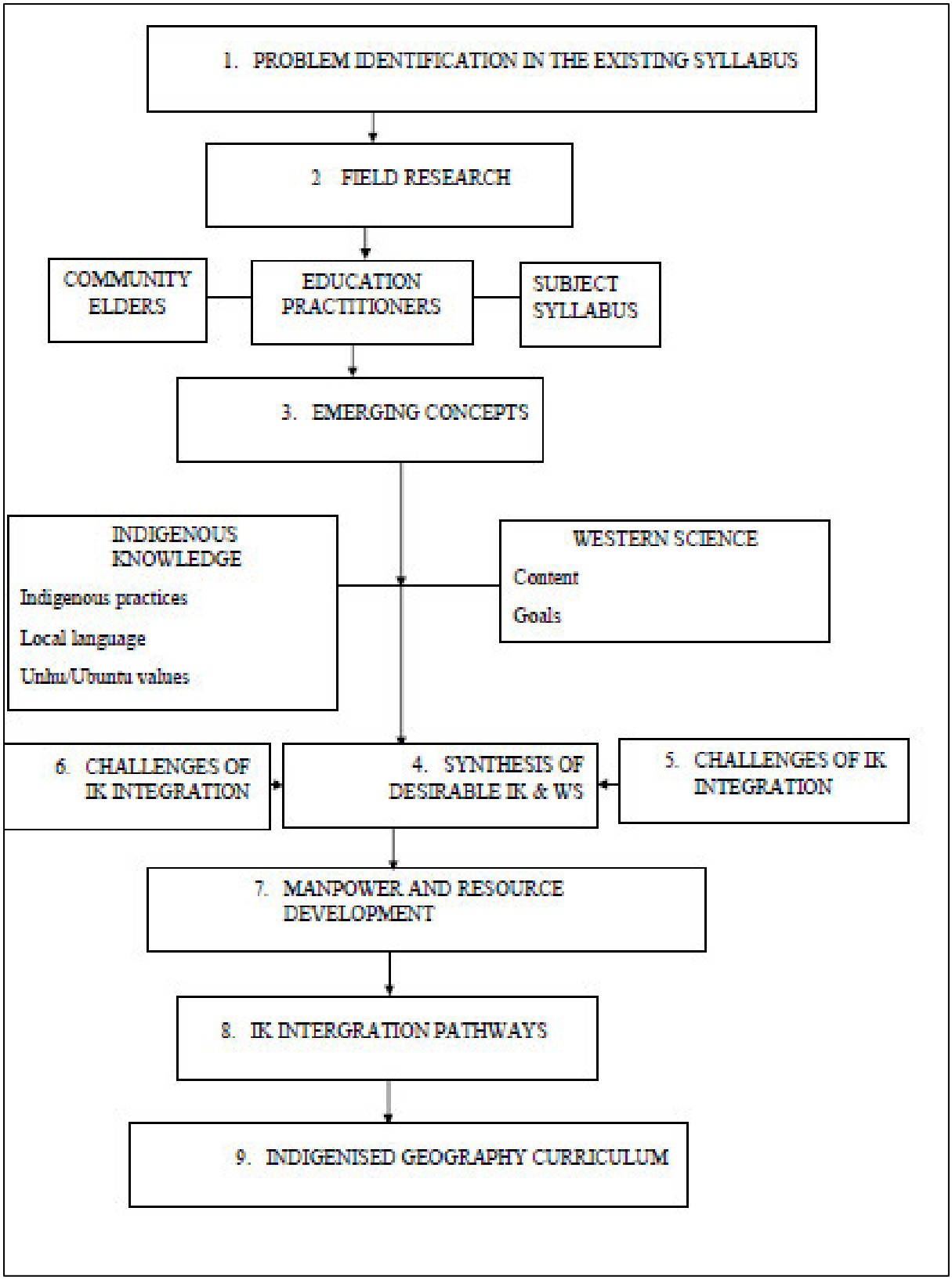

Figure 6.1: Process model for IK integration in Geography

Step 2 entailed field work in which data was collected from the community elders and education practitioners on their views of integrating IK; how it could be integrated in the Geography curriculum and the challenges that may be encountered in the process of integration.

In step 3 key issues that emerged from the participants from the field research are explored. The key emerging issues are synthesized in step 4 in order to establish a common ground of content that could be integrated in the Geography curriculum. The participants suggested that local language was a key concept to be integrated in the Geography curriculum. It also emerged that indigenous practices such as rain making ceremonies and indigenous methods of forecasting weather are central issues for integration. Cultural values such as unhu/ubuntu were key emerging concepts regarded as essential to be integrated in the Geography curriculum in order to produce a total person.

In step 5 there are challenges encountered during the process of IK integration. These range from religious, modernization, technological developments and lack of resources. Step 5 of the model involves the synthesis of desirable IK and western science that could feature in the Geography syllabus. In step 6 of the model there is manpower training and acquisition of resources in order to overcome the challenges faced in integrating indigenous knowledge. Integration of IK in the Geography syllabus could follow various pathways (step 7). These include the use of songs in the introduction of a lesson; infusing IK in the lesson development; selecting appropriate IK content to teach together with western science or teaching IK as a separate module and community engagement in the teaching of the subject matter. The final product, step 8 is the output of the process model that produces an IK inclusive subject curriculum. The curriculum includes desirable concepts from the indigenous and western world views.

6.12 Conclusion

The chapter theorized from the findings being guided by the three critical questions. It was evident that the integration of IK restores national identity and cultural practices. The integration of IK in Geography as a subject promotes particular pedagogical practices and comprehension of Geography concepts. It emerged from the findings that religious beliefs

influence the integration and teaching of indigenous knowledge. The other insight that emerged from the study was that indigenous cultural practices are embedded in the spiritual world thus integrating IK into the syllabus is inserting a spiritual dimension to the curriculum. The indigenous people make use of the environment to predict weather patterns. If indigenous ways of weather forecasting are integrated with WS to predict weather, weather forecast accuracy will improve. Other critical aspects discussed are factors that are an impediment to the integration of IK in the teaching of weather and climate in the secondary schools. Chapter 7 which is the last chapter provides the summary of the study, conclusions and recommendations emerging from the findings of the research questions.

CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

The previous chapter theorized the research findings on the integration of IK in the teaching of weather and climate in Geography in the secondary schools. This chapter provides the conclusions and recommendations that emanate from the research findings.

The research topic was based on the following topic: Integrating indigenous knowledge into the teaching of weather and climate in the Geography curriculum in secondary schools: The case of Manicaland in Zimbabwe. The study was guided by three critical questions as outlined below:

1. What are the teachers and community elders' conceptions on the decolonisation of the Geography curriculum and the integration of indigenous knowledge in the teaching of weather and climate in secondary schools?
2. How can indigenous knowledge feature in the teaching of the topic on weather and climate in Geography in secondary schools?
3. What could be the possible challenges of integrating indigenous knowledge in the teaching of weather and climate in Geography in secondary schools?

The section that follows provides conclusions and recommendations of the study.

7.2 Conclusions from the study

The conclusions from the study have been presented in three subheadings derived from the key research questions.

7.2.1 Teachers and Community elders' views on the decolonisation and teaching of IK in Geography

It was revealed that the integration of IK in the teaching of weather and climate was a way of restoring and revitalizing Zimbabwean national heritage. The participants felt that their culture has been lost through missionary activities, modernization and from technological developments. They therefore view the teaching of IK as a way of reviving their lost cultural values. It was further established that the decolonisation and integration of the IK in the teaching of weather and climate promoted national identity of Zimbabweans as a nation and as Africans. It was the view of the participants that the decolonisation and integration of IK in the Geography curriculum would reclaim the national identity of Zimbabweans that has been lost

to western culture. It was further unpacked that the integration and teaching of IK allows greater co-creation of new knowledge. Both learners and the community were viewed as contributors of knowledge in the teaching process. It was further established that the integration and teaching of IK promotes learner centred approaches. It was established that the integration of IK in teaching promoted participatory methods and more interesting lessons. It was further revealed that IK integration develops research skills among the learners since the learners would consistently carry out research from the communities.

The findings can be summed up by, The United Nations Declaration on the Rights on Indigenous People [UNDRIP] (United Nations, 2007) that gave a green light and institutional support for the integration of IK in the school curriculum. Article 31-1 of the UNDRIP, articulates the rights by indigenous people to pass on to their future generations their tradition and philosophy. Article 14-1 of the same UNDRIP further gave legal rights to the indigenous people to have a stake in the establishment of educational institutions which meet the expectations of their culture and language.

7.2.2 How IK can feature in the teaching of weather and climate in Geography

The research revealed that IK can feature in the form of teaching strategies. Various pathways of integrating IK in the teaching of Geography were examined. It was established that IK can be integrated and taught in the classroom context as an introduction to the lesson; as infused IK knowledge; as selected IK concepts or as a taught module on indigenous knowledge. Indigenous knowledge can also be taught in the context of family gatherings. The community elders can be invited at the school to teach on indigenous practices and experiences. It was further established that the elders are prepared to share their knowledge and experiences on their cultural practices. The teachers viewed IK as complementary rather than as competition to Western science. The research revealed that the teaching of Geography should be practically oriented and participatory in nature. Education should equip learners with survival skills in terms of solving social, economic and environmental problems in their communities. The research established that IK can also feature in the form of using local language terms used by the local community in the teaching of weather and climate. It was observed that the local people have rich indigenous terminology to describe atmospheric phenomena and processes such as air masses, clouds, precipitation forms and seasons. Further the study revealed that IK

can feature in the teaching of meteorology in the form of cultural practices and experiences. This can be revealed in form of various methods of predicting weather. Lastly it was established that the spiritual world forms the foundation of the indigenous people of Manicaland's belief systems and cultural practices.

7.2.3 Challenges of integrating IK in the teaching of weather and climate in Geography

The research established that that Missionary activities discouraged African traditions associated with beer drinking and performance of rain making ceremonies. The African traditions were regarded as evil activities. The community elders attributed the shunning of indigenous traditions by Missionaries and Western education as a hindrance to the full integration and teaching of IK in Geography in secondary schools. It was further established from the study that, urbanisation and modernity contributed in the breakdown of extended families. The community elders are failing to educate children indigenous values since the children are now spending most of their time on social media, viewing television and listening to the radio. The disintegration of family structures due to formal employment and migration to urban areas has made it difficult for family elders to teach indigenous practices to the children.

It was revealed that the government has instituted various laws and acts that protect the child from abuse. However, the elders felt that these laws on child rights have overprotected the child resulting in indiscipline among the children. The elders advocated for the inclusion of *ubuntu* values in the education system. The elders believe that, the children are attached to some western culture which causes indiscipline and disrespect. The different world views between the children and elders provide an uneven terrain for integration of IK in the teaching of weather and climate in the secondary schools.

The study further established that the lack of documented resources and lack of training by teachers in IK was a challenge to fully integrate IK in the teaching of weather and climate in Geography. There is scarcity of Zimbabwean text books on IK for use in the schools. This makes it difficult for the teachers to scheme, plan or prepare notes to teach.

The attitude and belief systems of the teachers are yet another hindrance in maximizing IK integration in the Geography curriculum. Some teachers due to their religious beliefs and previous experiences were not confident and did not believe in the teaching of indigenous traditions. They were therefore not prepared to teach IK in the secondary schools. On the other hand, some of the teachers believed that, IK has been replaced by modernization and Christianity. The teachers felt that some of the schools run by religious organizations may prescribe content to teach in their schools thus posing a challenge. Variations in language used in Manicaland province provide diversity in local terminology used to explain the same phenomena of weather and climate. This was viewed as posing a challenge particularly on assessment as the same concept is known by different terms.

7.3 Recommendations from the study

The study recommends the following:

- The Ministry of Primary and Secondary education should include the teaching of the traditions, history and culture of the indigenous people at all levels in the subject of geography in secondary schools. The community elders complain of cultural decay among the students. The *ubuntu* values should be stressed at all educational levels so that the education system produces a total person.
- Community elders knowledgeable on IK should be invited to teach in the schools. The role of community elders in providing indigenous education needs to be promoted and revitalized. The government could pay a token of appreciation in recognition of the service provided by the resource persons.
- There is need to balance parental expectations and children's rights afforded by government. The community needs to be engaged in legislation formulation to ensure this.
- There is lack of resources such as textbooks on IK for use in the schools. The government could fund research and the publishing of textbooks on indigenous knowledge.
- There is a need for financial and material support in order to promote the documentation on indigenous knowledge. Those who have the knowledge on IK are passing it on via the oral tradition, yet very little has been documented in writing.

- In-service training and workshops for the teachers in schools is required as most of them lack training in indigenous knowledge.

7.4 Recommendations for future research

The study makes the following recommendations for future researchers:

- There is need to carry out studies on IK in other regions, in order to explore more indigenous practices that can be included in the Geography curriculum. This research was focussed in one Manicaland Province only. The findings may not be applicable to other areas with different cultural practices.
- There is need to carry out more research on IK related to classroom practices and teaching pedagogies in different aspects of the Geography curriculum and other subject areas. Most of the research is on the forms and importance of IK without making reference to how this IK can be applied in the teaching of a topic or subject area

7.5 Conclusion

The integration of IK in the Geography curriculum in secondary schools has been viewed by participants in the study as a strategy of decololonising Geography education which has been overshadowed by the dominace of Eurocentric education. It is therefore a step towards restoration of African values and Zimbabwean heritage and national identity. The integration of IK in Geography education has been viewed by the participants as way of embracing and imparting *ubuntu* values to the learners. The study also revealed that, the inclusion of IK in Geography education entails community engagement whereby the community contributes to the knowledge the learners acquire in the classroom.

The study established various pathways which can be employed to integrate IK in the Geography curricum. Different ways in which IK can feature in the Geography curriculum were established including the application of indigenous terminogy in Geography teaching; indigenous ways of weather forecasting; the role of spirit mediums in rainmaking and indigenous pedagogy.

Despite some challenges of integrating IK in Geography education such as lack of documented sources on IK; lack of training in IK by some teachers; shortage of experts in IK and the

negative effects of urbanisation and media on IK, the integration of IK in Geography education remain a strategy of decolonising the Geography curriculum and promoting African values.

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APPENDIX A: Interview questions with Teachers

Research Question 1: What are the teachers and community elders' conceptions on the decolonisation of the Geography curriculum and the integration of IK in the teaching of weather and climate in secondary schools?

Mubvunzo wekutanga: Ndeapi maonero evaDziidzisi neveMunharaunda maererano nekuvandudza gwaro rezvidziidzo zveJogirafu rairatidza upambepfumi tichidziidzisa ruzivo rwechivanhu chedu muzvidziidzo zvemamiriro ekunze padanho re kusekondari?

1. What are your views on decolonising the Geography curriculum and the integration of IK in the teaching of weather and climate in secondary schools?

   Ndeapi maonero enyu pamusoro pekusandura gwaro rezvidziidzo zveJogirafu rairatidza upambepfumi kuti tidziidzise ruzivo rwechivanhu chedu muzvidziidzo zvemamiriro ekunze padanho re kusekondari?

2. What do you think should be removed from the current topic on weather and climate at ordinary level in order to give way to integration of some aspects of indigenous knowledge on weather and climate?

   Munofunga kuti ndezvipi zvingabviswa panezvidziidzwa zviripo zvemamiriro ekunze pa gwaro rechina kusekondari kuti tipe mukana wekudziidzisa zvidimbu zveruzivo rwechivanhu pane zvemamiriro ekunze?

3. What aspects of IK on weather and climate do you think should be added in the teaching of the Geography syllabus component on weather and climate?

   Ndechipi chidimbu cheruzivo rwechivanhu maererano nemamiriro ekunze chinofanirwa kuwedzerwa pakudziidziswa kwegwaro rezvidziidzo zveJogirafu maererano nemamiriro ekunze?

4. In which way do you think integrating IK in the teaching of weather and climate would help the learners?

   Nedzipi nzira dzamunofunga kuti kudziidzisa ruzivo rwechivanhu muzvidziidzo zvemamiriro ekunze zvingabatsira vadziidzi?

5. How can integration of IK into the Geography syllabus disadvantage the learners?

   Kudziidzisa ruzivo rwechivanhu murugwaro rwezvidziidzo zveJogirafu zvingakanganisa vadziidzi panezvipi?

6. As a Geography teacher, how does integrating IK in the Geography syllabus help you in the teaching of weather and climate?

   Semudziidzisi weJogirafu, kusanganisa zvidziidzo zvechivanhu mugwaro reJogirafu zvinobatsira chii pakudziidzisa zvidziidzo zvemamirire ekunze?

7. In which way do you think incorporating IK in the teaching of weather and climate would add the value of Geography?

   Ndedzipi nzira dzamunofunga kuti kusanganisa zvidziidzo zvechivanhu mukudziidzisa maererano ne mamiriro ekunze zvingawedzera udzamu hwe Jogirafu

8. What are your views on inviting Community elders to teach indigenous knowledge on weather and climate during the Geography lessons?

   Ndeapi maonero enyu maererano nekukoka Vasharuka/Vakuru venzvimbo kuti vadziidzise ruzivo zvechivanhu pamusoro pemamiriro ekunze nguva yezvidziidzo zve Jogirafu?

9. In which way do you think adding IK in the Geography syllabus would water down its content and competiveness of the subject?

   Ndedzipi nzira dzamunofunga kuti kuwedzera zvidziidzo zvechivanhu mugwaro rezvidziidzo zve Jogirafu zvingaderedza kukosha kwe chidziidzo ichi?

10. What challenges do you think would hinder the integration of IK in the teaching of weather and climate at school level?

    Ndezvipi zvibingamipini zvaunofunga kuti zvingadzivirira kusanganiswa kwezvidziidzo zvechivanhu mukudziidziswa kwemamiriro ekunze pachikoro?

11. Can you explain how you would use IK in teaching any topic on weather and climate?

    Ko mungatsanangura here kuti mungashandisa sei ruzivo rwechivanhu pakudziidzisa chidziidzo chemamiriro ekunze?

12. What do you think would be the challenges of integrating IK in the Geography syllabus at national level?

    Ndeapi matambudziko angasangana neNyika pakudziidzisa zvechivanhu muzvidziidzo zveJogirafu?

13. How can these challenges be overcome for the full implementation of incorporating IK in the teaching of weather and climate?

Matambudziko aya angakundikana sei kuti zvidziidzo zveruzivo rwechivanhu zvemamirire ekunze zvifambe zvakanaka?

Research Question 2: How can IK feature in the teaching of the topic on weather and climate in secondary schools?

Mubvunzo wechipiri: *Ruzivo rwechivanhu rungadziidziswa sei muzvidziidzo zvemamirire ekunze pagwaro rechina?*

1. What IK is currently in the Geography syllabus on weather and climate?

   Ndezvipi zvidziidzo zvechivanhu parizvino zviri mugwaro rezvidziidzwa zveJogirafu zvemamiriro ekunze?

2. Which local knowledge related to weather and climate can be integrated in the teaching of the current component on weather and climate?

   Nderipi ruzivo rwechivanhu zvinechekuita nemamiriro ekunze zvinogona kudziidziswa parizvino pamusoro pechidziidzo chehemamirire ekunze?

3. Which topics on weather and climate in the existing Geography syllabus can be integrated with IK?

   Ndezvipi zvidziidzo zvemamirire ekunze zvirimurugwaro rezvidziidzo zveJogirafu zvingadziidziswa pamwe chete neruzivo rwechivanhu?

4. How can this indigenous knowledge be integrated in the topic on weather and climate?

   Ruzivo rwechivanhu rungadziidziswa sei nemusoro wezvidziidzo zvemamirire ekunze?

5. How can the integrated local knowledge on weather and climate be taught and assessed?

   Ruzivo rwechivanhu rwemamirire ekunze rungadziidziswa ne kuongororwa sei?

6. How would you prepare a lesson on weather and climate that incorporate IK at secondary school level?

   Ungagadzira sei chidziidzo chiripamusoro pemamirire ekunze uchishandisa ruzivo rwechivanhu padanho re kusekondari?

7. How do you think the following can be used in the teaching of weather and climate in your lessons?

a). Proverbs
b).riddles
c). folktales
d). taboos and myths
e). biological and physical environment
f). community elders

Unofunga kuti zvinhu zvinotevera izvi zvingashandiswa sei pachidziidzo chemamirire ekunze?
a). tsumo
b). chibhende
c. ngano
d). zviereswa ne zvifungidzirwa
e). zvakatitenderedza zvipenyu nezvisiri zvipenyu
f) VaSharuka/Vakuru venzvimbo

Research Question 3: What are the challenges of integrating IK in the teaching of weather and climate?

Mubvunzo weChitatu: Ndezvipi zvimhingamupini zvekusanganisa ruzivo rwechivanhu mukudziidzisa zvemamirire ekunze?

1. What challenges are you likely to face in the integration and teaching of IK on the topic of weather and climate in the following areas:

   Ndezvipi zvimhingamupini zvamunokwanisa kusangana nazvo mukudziidzisa ruzivo rwechivanhu pamusoro wenyaya yezvemamirire ekunze pane zvinotevera?

ii). Integrating IK content in the Geography syllabus;

Kusanganisa ruzivo rwechivanhu mugwaro rezvidziidzo zveJogirafu;

iii). Teaching the IK content on weather and climate;

Kudziidzisa ruzivo rwechivanhu pamusoro pemamirire ekunze;

iv) . Assessment of IK and

Ongororo yeruzivo rwechivanhu;

v). Teaching resources.

Zvombo zvekudziidzisa.

2. What challenges can be faced by the school in integrating IK in the teaching weather and climate?

Ndezvipi zvibingamupini zvingakwanisa kusanganwa nazvo mukudziidzisa ruzivo rwechivanhu pamusoro pemamirire ekunze

3. Which challenges do you think can be faced by the Zimbabwe School Examination Council (ZIMSEC) and Curriculum development unit on the integration and teaching of IK?

   Ndezvipi zvibingamupini zvamunofungidzira zvingasangana nebato repamusoro reZimbabwe rinoongorora bvunzo muzvikoro(ZIMSEC) ne bato rinosimudzira urongwa hwezvidziidzo pamusoro pekudziidzisa muzvikoro ruzivo rwechivanhu?

4. How equipped and prepared are you as Teachers in the integration and teaching of IK on weather and climate?

   Sevadziidzisi muneruzivo here uye kugadzirira kudziidzisa zvidziidzo zvechivanhu zvemamirire ekunze?

5. What challenges are likely to be faced in an effort to decolonise the Geography curriculum?

   Ndezvipi zvibingaidzo zvamunotarisira kusangana nazvo muchinangwa chekudzikinura gwaro redziidzo reJogirafu kuti rive nezvidziidzo zvechivanhu?

6. What do you think should be done to overcome or reduce the challenges of integrating and teaching IK in the Geography syllabus?

   Munofunga kuti ndezvipi zvingaitwe kuti tikunde zvipingaidzo kana kuzvideredza pakuisa zvidziidzo zvechivanhu mugwaro reJogirafu rekudziidza uye kuzvidziidzisa?

7. What challenges can emanate from the local community on integrating IK in the teaching of weather and climate?

   Ndezvipi zvipingaidzo zvinogona kubuda kubva muvagari venharaunda pakuisa zvidziidzo zvechivanhu pakudziidzisa zvemamiriro ekunze

Appendix B: Interview Questions with Community Elders

Research Question 1: What are Community elders' conceptions on the decolonisation of the Geography curriculum and the integration of IK in the teaching of weather and climate at secondary school level?

Mubvunzo wekutanga: Ndeapi maonero enyu sevakuru veMunharaunda maererano nekuvandudza gwara rekudziidza rairatidza upambepfumi tichidziidzisa ruzivo rwechivanhu chedu muzvidziidzo zvemamiriro ekunze pagwaro re kusekondari?

1. What are your views on integrating IK in the teaching of weather and climate at secondary school level?

   Ndedzipi pfungwa dzenyu pamusoro pekudziidzisa zvidziidzo zvechivanhu muzvidziidzo zvemamirire ekunze?

2. In which way do you think integrating IK in the teaching of weather and climate would help the Learners?

   Ndedzipi nzira dzamunofunga kuti kudziidzisa zvidzidzo zvechinyakare zvemamiriro ekunze zvingabatsira Vadziidzi?

3. How can integration of IK into the Geography syllabus disadvantage the learners?

   Ko ruzivo zvechivanhu rukadziidziswa muzvidziidzo zve Jogirafu zvingakanganisa vadziidzi panezvipi?

4. As Community elders, how does integrating IK in the study of weather and climate benefit your community?

   Sevakuru venzvimbo, kudziidzisa ruzivo rwechivanhu pakudziidza kwemamiriro ekunze kungabatsira sei nharaunda yenyu?

5. In which way do you think incorporating IK in the teaching of weather and climate would add the value of Geography?

   Ndeipi nzira yamunofunga kuti ruzivo rwechivanhu rungabatsira pakudziidzisa zvemamirire ekunze?

6. What are your views as Elders on being invited to teach IK on weather and climate during the Geography lessons?

   Ndeapi maonero enyu sevanhu vakura pakuti imi mupote muchisheedzwa kudziidzisa ruzivo rwechivanhu rwemamiriro ekunze muzvidziidzo zve Jogirafu?

7. In which way do you think adding IK in the Geography syllabus would water down its content and competiveness of the subject?

   Ndedzipi nzira dzamunofunga kuti kuwedzera ruzivo rwechivanhu muzvidzidzwa zveJogirafu zvingaderedza ruzivo nekukosha kweJogirafu?

8. What challenges do you think would hinder the integration of IK in the teaching of weather and climate at secondary school level?

   Ndezvipi zvimhingamupini zvamunofunga kuti zvingadzosera mumashure urongwa hwekudziidzisa ruzivo rwechivanhu rwemamirire ekunze padanho rechikoro?

9. Can you explain IK that could be integrated in teaching of weather and climate?

   Ko mungatsanangura here ruzivo rwechivanhu rungashandiswa pakudziidzisa zvemamirire ekunze?

10. What do you think would be the challenges of integrating IK in the Geography syllabus at National level?

    Ndezvipi zvibingamupini zvamunofunga kuti zvingasanganwa nazvo pakudziidzisa ruzivo rwechivanhu muzvidziidzo zve Jogirafu padanho reNyika?

11. How can these challenges be overcome for the full implementation of incorporating IK in the teaching of weather and climate?

    Ko zvibingamupini izvi zvingakundikana sei kuti zvidzidzo zvechivanhu zve mamirire ekunze zvifambe zvakanaka?

Research Question 2: How can IK feature in the teaching of the topic on weather and climate at secondary school level?

Mubvunzo weChipiri: Ko ruzivo rwechivanhu rungaburitswa sei pakudziidzisa musoro wenyaya wemamirire ekunze pachidanho chesekondari?

1. What indigenous knowledge on weather and climate do you think can feature in the Geography syllabus at secondary school level?

   Nderupi ruzivo rwechivanhu rwemamirire ekunze rwamungafunga kuti rungawedzerwa muzvidziidzo zveJogirafu padanho rekusekondari?

2. Which local knowledge do you practice in your community regarding weather, climate and seasons which you have the feeling that it should be taught to your children in the secondary schools?

   Nderupi ruzivo rwechivanhu rwamunoshandisa munharaunda yenyu inechekuita nezvemamiriro ekunze nemwaka zvamunofunga kuti zvinofanirwa kudziidziswa vana mu zvikoro?

3. Which indigenous methods do you use to teach your children at home that could be used by teachers in the secondary schools to teach weather and climate?

   Ndedzipi nzira dzechivanhu dzamunoshandisa kudziidzisa vana kudzimba dzenyu dzingashandiswa nevadziidzisi muzvikoro kudziidzisa chidziidzo chemamirire ekunze?

4. What are your views on the integration and teaching of IK on weather and climate in the secondary schools?

   Maonero enyu ndeapi papfungwa yekudziidzisa ruzivo rwechivanhu maererano nemamirire ekunze muzvikoro?

5. Of what importance do you think IK on weather and climate would be of value to your community and children if integrated in the Geography syllabus?

   Munofunga kuti zvingabatsira panezvipi munharaunda nekuvana venyu kana ruzivo rwechivanhu rwemamirire ekunze rukadziidziswa murugwaro rweJogirafu?

6. How might this local knowledge on weather and climate be of no importance to your community if integrated in the Geography syllabus?

   Ko ruzivo rwechivanhu rwemamirire ekunze rungatadza kupa rubatsiro munharaunda yenyu nenzira dzipi kana rukadziidziswa murugwaro rweJogirafu?

7. What do you think should be done to preserve this local knowledge on weather and climate which you have?

   Munofunga kuti zvingaitwa sei kuti tichengetedze ruzivo rwechivanhu rwamuinarwo maererano nemamirire ekunze?

8. What are some of the problems you think can be faced if your children are taught your local culture and knowledge in secondary schools?

   Ndeapi matambudziko amunofunga kuti angasangana nevana venyu kana vakadziidziswa ruzivo rwetsika nemagariro echivanhu muzvikoro?

Research Question 3: What are the challenges of integrating IK in the teaching of weather and climate?

Mubvunzo weChitatu: Ndezvipi zvibingamupini zvingawanika pakudziidzisa ruzivo rwechivanhu zvemamirire ekunze?

1. As Community elders what challenges do you foresee in an attempt to integrate IK on weather and climate in Geography at secondary school level?

   SeVakuru venharaunda ndezvipi zvibingamupini zvamungatarisira pakudziidzisa ruzivo rwechivanhu rwemamiriro ekunze murugwaro rweJogirafu padanho resekondari?

2. Do you think the local community have knowledgeable people who can teach indigenous knowledge on weather and climate in the secondary schools?

   Pamaonero enyu tine vakuru venharaunda ino here vaneruzivo rwechivanhu pamusoro pemamirire ekunze vangakwanisa kudziidzisa muzvikoro?

3. What are some of the challenges you can experience in an effort to predict weather, seasons and climate using your indigenous methods?

   Ndezvipi zvibingamupini zvamungakwanisa kusangana nazvo pavavariro yenyu yekutiudza zvichaitika pamamiriro ekunze ne mwaka tichishandisa ruzivo rwenyu rwechivanhu?

4. How accurate are your indigenous methods in the study of weather and climate?

   Nzira dzechivanhu dzamunoshandisa kuongorora mamirire ekunze dzine chokwadi zvakadini?

5. What challenges can you experience if requested to teach IK methods on weather and climate to your children in the secondary schools?

   Zvimhingamupini zvamunotarisira kusangana nazvo ndezvipi kana mukanzi mushandise nzira dzechivanhu kudziidzisa zvemamiriro ekunze kuvadziidzi muzvikoro?

6. Are there any challenges to your culture and traditions if taught in schools and made public?

   Pangave ne zvimhingamupini here kana tsika nemagariro enyu zvikadziidziswa muzvikoro nekuvanhu vose?

7. As Community leaders what are you doing to preserve your cultural heritage regarding weather and climate?

   Imi seVakuru uye Vatungamiri venzvimbo ino pane zvamurikuita here kuchengetedza pfuma yetsika nemagariro edu pamusoro penyaya yemamirire ekunze?

8. What do you think should be done to effectively incorporate the teaching of IK on weather and climate in the secondary schools?

   Ndezvipi zvamunofunga kuti zvingaitwe kuti kudziidziswa kweruzivo rwechivanhu maererano nemamiriro ekunze zvifambe zvakanaka?

Appendix C: Interview questions with Provincial Geography Inspector and Provincial Curriculum Development Unit Officer

Research Question 1: What are your conceptions on the decolonisation of the Geography curriculum and the integration of Indigenous Knowledge (IK) in the teaching of weather and climate at secondary school level?

Mubvunzo wekutanga: Ndeapi maonero enyu seMukuru veJogira pa DunhuM/Mukuru wezvidziidzwa maererano nekuvandudza gwara rekudziidza rairatidza upambepfumi tichidziidzisa ruzivo rwechivanhu chedu muzvidziidzo zvemamiriro ekunzepadanho rekusekondari?

1. What are your views on integrating IK in the teaching of weather and climate at secondary school level?

   Ndedzipi pfungwa dzenyu maererano nekudziidziswa ruzivo rwechivanhu rwemamiriro ekunze padanho rechina?

2. In which way do you think integrating IK in the teaching of weather and climate would help the learners?

   Ndedzipi nzira dzamunofunga kuti kudziidzisa zvidzidzo zvechinyakare zvemamiriro ekunze zvingabatsira Vadziidzi?

3. How can integration of IK into the Geography syllabus disadvantage the learners?

   Ko ruzivo zvechivanhu rukadziidziswa muzvidziidzo zve Jogirafu zvingakanganisa vadziidzi panezvipi?

4. As Geography Inspector/Curriculum Development Officer, how does integrating IK in the study of weather and climate benefit the learners?

   SeMukuru veJogira pa DunhuM/Mukuru wezvidziidzwa, kudziidzisa ruzivo rwechivanhu mukudziidza zvemamirire ekunze zvingabatsira sei Vadziidzi?

5. In which way do you think incorporating IK in the teaching of weather and climate would add the value of Geography?

   Ndeipi nzira yamunofunga kuti ruzivo rwechivanhu pakudziidzisa zvemamirire ekunze ingawedzera kukosha kwechidziidzo cheJogirafu?

6. What are your views as Geography Inspector/Curriculum Development Officer on inviting resource persons to teach IK on weather and climate during the Geography lessons?

   Ndeapi maonero enyu seVakuru veJogirafu/Mukuru wezvidziidzwa kuti imi mupote muchisheedzwa kudziidzisa ruzivo rwechivanhu rwemamiriro ekunze muzvidziidzo zve Jogirafu?

7. In which way do you think adding IK in the Geography syllabus would water down its content and competiveness of the subject?

   Ndedzipi nzira dzamunofunga kuti kuwedzera ruzivo rwechivanhu muzvidzidzwa zveJogirafu zvingaderedza ruzivo nekukosha kweJogirafu?

8. What challenges do you think would hinder the integration of IK in the teaching of weather and climate at secondary school level?

   Ndezvipi zvibingamupini zvamunofunga kuti zvingasanganwa nazvo pakudziidzisa ruzivo rwechivanhu muzvidziidzo zve Jogirafu padanho rechikoro?

9. Can you explain IK that could be integrated in teaching of weather and climate?

   Mungatsanangura here ruzivo rwechivanhu rungadziidziswa pamusoro pemamirire ekunze?

10. What do you think would be the challenges of integrating IK in the Geography syllabus at national level?

    Ndezvipi zvibingamupini zvamunofunga kuti zvingasanganwa nazvo pakudziidzisa ruzivo rwechivanhu muzvidziidzo zve Jogirafu padanho reNyika?

11. How can these challenges be overcome for the full implementation of incorporating IK in the teaching of weather and climate?

    Ndezvipi zvamunofunga kuti zvingaitwe kuti kudziidziswa kweruzivo rwechivanhu maererano nemamiriro ekunze zvifambe zvakanaka?

Research Question 2: How can IK feature in the teaching of the topic on weather and climate at secondary school level?

Mubvunzo wechipiri: *Ruzivo rwechivanhu rungadziidziswa sei muzvidziidzo zvemamirire ekunze pagwaro rechina?*

1. What IK is currently in the ordinary level Geography syllabus on weather and climate?

Ndezvipi zvidziidzo zvechivanhu parizvino zviri murugwaro rezvidziidzwa zveJogirafu zvemamiriro ekunze?

2. How can IK feature in the teaching of weather and climate in Geography at secondary school level?

   Ko ruzivo rwechivanhu rungaburitswa sei pakudziidzisa zvemamirire ekunze muzvidziidzo zveJogirafu padanho rekusekondari?

3. Which indigenous knowledge do you think can be integrated in the teaching of weather and climate?

   Nderupi ruzivo rwechivanhu rwamunofunga kuti rungadziidziswa rwakananganana nemamiriro ekunze?

4. Which topics can be integrated with IK on weather and climate in the current Geography syllabus at secondary school level?

   Ndezvipi zvidziidzo zvemamirire ekunze zvirimurugwaro rezvidziidzo zveJogirafu zvingasanganiswa neruzivo rwechivanhu padano rekuSecondary?

5. How can the integrated indigenous knowledge on weather and climate be taught in Geography at secondary school level?

   Ruzivo rwechivanhu rwemamirire ekunze rungadziidziswa sei muzvidziidzo zve Jogirafu padano rekusekondari?

6. How can the integrated indigenous knowledge on weather and climate be assessed?

   Ko dziidziso yechivanhu yemamirire ekunze ingaongaongororwa sei?

Research Question 3: What are the challenges of integrating IK in the teaching of weather and climate at secondary school level?

Mubvunzo weChitatu: Ndezvipi zvimhingamupini zvingasanganwa nazvo pakudziidzisa ruzivo rwechivanhu pamamirire ekunze padanho re kusekondari?

1. What challenges are likely to be faced by Teachers as a result of integrating indigenous knowledge in the following areas:

Ndezvipi zvimhingamupini zvingasangana neVadziidzisi kubudikidza nekudziidzisa ruzivo rwechivanhu pane zvinotevera: i). Integrating IK content in the Geography syllabus

Kusanganisa ruzivo rwechivanhu mugwaro rezvidziidzo zveJogirafu

ii). Teaching the IK content on weather and climate and

Kudziidzisa ruzivo rwechivanhu pamusoro pemamirire ekunze

iii. Assessment of indigenous knowledge.

Ongororo yeruzivo rwechivanhu

iv). Human manpower

Vashandi

vi). Teaching materials

Zvombo zvekudziidzisa.

2. What challenges can be faced by the schools in integrating IK on teaching weather and climate?

   Ndezvipi zvimhingamupini zvingasanganiwa nazvo nezvikoro pakudziidzisa ruzivo rwechivanhu pamamirire ekunze?

3. Which challenges do you think can be faced by the Zimbabwe School Examination Council (ZIMSEC) and Curriculum Development Unit (CDU) in the integration and teaching of IK on weather and climate at secondary school level?

   Ndezvipi zvibingamupini zvamunofungidzira zvingasangana neBato repamusoro reZimbabwe rinoongorora bvunzo muzvikoro(ZIMSEC) neBato rinosimudzira urongwa hwezvidziidzo(CDU) pamusoro pekudziidzisa muzvikoro ruzivo rwechivanhu rwemamirire ekunze padanho re kusekondari?

4. How prepared are you as Supervisors and Quality controllers in the integration and teaching of IK related to weather and climate in secondary schools?

   SeVatungamiri vezvikoro makagadzirira here kuti ruzivo rwechivanhu rwemamirire ekunze rudziidziswe muzvikoro?

5. What do you think should be done to overcome or reduce the challenges of integrating and teaching of IK in Geography at secondary school level?

Munofunga kuti zvingaitwa sei kuti zvimhingamupini zvekudziidzisa ruzivo rwechivanhu muzvidziidzo zveJogirafu padanho rekusekondari zvikundwe kana kuderedzwa?

Appendix D: Focus group discussion questions with Teachers

Research Question 1: What are teachers' conceptions on the decolonisation of the Geography curriculum and the integration of Indigenous knowledge (IK) in the teaching of weather and climate at secondary school level?

Mubvunzo wekutanga: Ndeapi maonero evaDziidzisi maererano nekuvandudza gwaro rekudziidza rairatidza upambepfumi tichidziidzisa ruzivo rwechivanhu chedu muzvidziidzo zvemamiriro ekunze padanho re kusekondari?

1. What are your views on integrating IK in the teaching of weather and climate at secondary school level?

   Ndeapi maonero enyu pamusoro pekudziidzisa ruzivo rwechivanhu chedu pamusoro pemamiriro ekunze padanho re kusekondari?

2. In which way do you think integrating IK in the teaching of weather and climate would help the learners?

   Nedzipi nzira dzamunofunga kuti kudziidzisa ruzivo rwechivanhu muzvidziidzo zvemamiriro ekunze zvingabatsira vadziidzi?

3. How can integration of IK in the Geography syllabus disadvantage the learners?

   Kudziidzisa ruzivo rwechivanhu murugwaro rwezvidziidzo zveJogirafu zvingakanganisa vadziidzi panezvipi?

4. As a Geography teacher, how does integrating IK in the Geography syllabus help you in the teaching of weather and climate?

   Semudziidzisi weJogirafu, Kusanganisa zvidziidzo zvechivanhu murugwaro rweJogirafu zvinobatsira chii pakudziidzisa zvidziidzo zvemamirire ekunze?

5. In which way do you think incorporating IK in the teaching of weather and climate would add the value of Geography?

   Ndedzipi nzira dzamunofunga kuti kudziidzisa zvechivanhu maererano ne mamiriro ekunze zvingawedzera udzamu hwe Jogirafu

6. What are your views on inviting community elders to teach IK on weather and climate during Geography lessons?

   Ndeapi maonero enyu maererano nekukoka Vakuru venzvimbo kuti vadziidzise ruzivo rwechivanhu pamamiriro ekunze nguva yezvidziidzo zve Jogirafu?

7. In which way do you think adding IK in the Geography syllabus would water down its content and competiveness of the subject?

   Ndedzipi nzira dzaunofunga kuti kudziidzisa zvechivanhu murugwaro rwezvidziidzo zve Jogirafu zvingaderedza kukosha kwe chidziidzwa ichi?

8. What challenges do you think would hinder the integration of IK in the teaching of weather and climate at secondary school level?

   Ndezvipi zvipingamupini zvaunofunga kuti zvingadzivirira kudziidzisa ruzivo rwechivanhu rwemamiriro ekunze pachikoro?

9. What do you think would be the challenges of integrating IK in the Geography syllabus at national level?

   Ndeapi matambudziko angasangana neNyika pakudziidzisa zvechivanhu muhurongwa hwezvidziidzo zveJogirafu?

10. How can these challenges be overcome for the full implementation of incorporating IKS in the teaching of weather and climate?

    Matambudziko aya angakundikana sei kuti zvidziidzo zvechivanhu zvemamirire ekunze zvifambe zvakanaka?

Research Question 2: How can IK feature in the teaching of the topic on weather and climate at secondary school level?

Mubvunzo weChipiri: *Ruzivo rwechivanhu rungadziidziswa sei muzvidziidzo zvemamirire ekunze padanho re kusekondari?*

1. What IK is currently in the Geography syllabus on weather and climate?

   Ndezvipi zvidziidzo zvechivanhu parizvino zviri murugwaro rezvidziidzwa zveJogirafu zvemamiriro ekunze?

2. Which local knowledge can be integrated in the teaching of weather and climate?

   Nderupi ruzivo rwechivanhu zvinechekuita nemamiriro ekunze zvinogona kudziidziswa pechidziidzo chchemamirire ekunze?

3. Which topics on weather and climate in the existing Geography syllabus can be integrated with IK?

   Ndezvipi zvidziidzo zvemamirire ekunze zvirimurugwaro rezvidziidzo zveJogirafu zvingasanganiswa neruzivo rwechivanhu?

4. How can this indigenous knowledge be integrated in the topic on weather and climate?

   Ruzivo rwechivanhu rungasanganiswa sei nemusoro wezvidziidzo zvemamirire ekunze?

5. How can the integrated local knowledge be taught and assessed?

   Ruzivo rwechivanhu rwemamirire ekunze rungadziidziswa ne kuongororwa sei?

6. How would you prepare a lesson on weather and climate at ordinary level that incorporates IK?

   Ungagadzira sei chidziidzo chemamirire ekunze uchishandisa ruzivo rwechivanhu padanho rechinha kusekondari?

7. How do you think the following can be used in the teaching of weather and climate:

   a). Proverbs
   b). riddles
   c). folktales
   d). taboos and myths
   e). biological and physical environment
   f). community elders

7. Unofunga kuti zvinhu zvinotevera izvi zvingashandiswa sei pachidziidzo chemamirire ekunze?

   a). tsumo
   b). chibhende
   c. ngano
   d). zviereswa ne zvifungidzirwa
   e). zvakatitenderedza zvipenyu nezvisiri zvipenyu
   f) VaSharuka/Vakuru venzvimbo

Research Question 3: What are the challenges of integrating IK in the teaching of weather and climate?

Mubvunzo weChitatu: Ndezvipi zvimhingamupini zvekusanganisa ruzivo rwechivanhu mukudziidzisa zvemamirire ekunze?

1. What challenges are you likely to face in the integration and teaching of IK on the topic of weather and climate in the following areas:

   Ndezvipi zvimhingamupini zvatinokwanisa kusangana nazvo mukusanganisa ruzivo rwechivanhu mukudziidzisa musoro wenyaya wezvemamirire ekunze pane zvinotevera?

ii). Integrating IK content in the Geography syllabus;

Kusanganisa ruzivo rwechivanhu mugwaro rezvidziidzo zveJogirafu

iii). Teaching the IK content on weather and climate;

Kudziidzisa ruzivo rwechivanhu pamusoro pemamirire ekunze

iv) . Assessment of IK and

Ongororo yeruzivo rwechivanhu

v). Teaching resources.

Zvombo zvekudziidzisa.

2. What challenges can be faced by the school in integrating IK in the teaching weather and climate?

Ndezvipi zvibingamupini zvingakwanisa kusanganwa nazvo mukudziidzisa ruzivo rwechivanhu pamusoro pemamirire ekunze

3. Which challenges do you think can be faced by the Zimbabwe School Examination Council (ZIMSEC) and Curriculum development unit on the integration and teaching of IK?

   Ndezvipi zvibingamupini zvamunofungidzira zvingasangana nebato repamusoro reZimbabwe rinoongorora bvunzo muzvikoro(ZIMSEC) ne bato rinosimudzira urongwa hwezvidziidzo pamusoro pekudziidzisa muzvikoro ruzivo rwechivanhu?

4. How equipped and prepared are you as teachers in the integration and teaching of IK on weather and climate?

   Sevadziidzisi muneruzivo here uye kugadzirira kudziidzisa zvidziidzo zvechivanhu zvemamirire ekunze?

5. What challenges are likely to be faced in an effort to decolonise the Geography curriculum?

   Ndezvipi zvipingaidzo zvamunotarisira kusangana nazvo muchinangwa chekudzikinura gwaro redziidzo reJogirafu kuti rive nezvidziidzo zvechivanhu?

6. What do you think should be done to overcome or reduce the challenges of integrating and teaching IK in the Geography syllabus?

   Munofunga kuti ndezvipi zvingaitwe kuti tikunde zvipingaidzo kana kuzvideredza pakuisa zvidziidzo zvechivanhu mugwaro reJogirafu rekudziidza uye kuzvidziidzisa?

7. What challenges can emanate from the local community on integrating IK in the teaching of weather and climate?

   Ndezvipi zvipingaidzo zvinogona kubuda kubva muvagari venharaunda pakuisa zvidziidzo zvechivanhu pakudziidzisa zvemamiriro ekunze

Appendix E: Focus Group Discussion questions with Community Elders

Research Question 1: What are community elders' viewss on the decolonisation of the Geography curriculum and the integration of Indigenous Knowledge (IK) in the teaching of weather and climate at secondary school level?

Mubvunzo wekutanga: Ndeapi maonero evaDziidzisi neveMunharaunda maererano nekuvandudza gwara rekudziidza rairatidza upambepfumi tichidziidzisa ruzivo rwechivanhu chedu muzvidziidzo zvemamiriro ekunze pagwaro rechina kusekondari?

1. What are your views on integrating IK in the teaching of weather and climate at secondary school level?

   Ndedzipi pfungwa dzenyu pamusoro pekudziidzisa zvidziidzo zvechivanhu muzvidziidzo zvemamirire ekunze?

2. In which way do you think integrating IK in the teaching of weather and climate would help the learners?

   Ndedzipi nzira dzamunofunga kuti kudziidzisa zvidzidzo zvechinyakare zvemamiriro ekunze zvingabatsira Vadziidzi?

3. How can integration of IK into the Geography syllabus disadvantage the learners?

   Ko ruzivo zvechivanhu rukadziidziswa muzvidziidzo zve Jogirafu zvingakanganisa vadziidzi panezvipi?

4. As Community elders, how does integrating IK in the study of weather and climate benefit your community?

   Sevakuru venzvimbo, kudziidzisa ruzivo rwechivanhu pakudziidza kwemamiriro ekunze kungabatsira sei nharaunda yenyu?

5. In which way do you think incorporating IK in the teaching of weather and climate would add the value of Geography?

   Ndeipi nzira yamunofunga kuti ruzivo rwechivanhu rungabatsira pakudziidzisa zvemamirire ekunze?

6. What are your views as Elders on being invited to teach IK on weather and climate during the Geography lessons?

   Ndeapi maonero enyu sevanhu vakura pakuti imi mupote muchisheedzwa kudziidzisa ruzivo rwechivanhu rwemamiriro ekunze muzvidziidzo zve Jogirafu?

7. In which way do you think adding IK in the Geography syllabus would water down its content and competiveness of the subject?

   Ndedzipi nzira dzamunofunga kuti kuwedzera ruzivo rwechivanhu muzvidzidzwa zveJogirafu zvingaderedza ruzivo nekukosha kweJogirafu?

8. What challenges do you think would hinder the integration of IK in the teaching of weather and climate at secondary school level?

   Ndezvipi zvimhingamupini zvamunofunga kuti zvingadzosera mumashure urongwa hwekudziidzisa ruzivo rwechivanhu rwemamirire ekunze padanho rechikoro?

9. Can you explain IK that could be integrated in the teaching of weather and climate?

   Ko mungatsanangura here ruzivo rwechivanhu rungashandiswa pakudziidzisa zvemamirire ekunze?

10. What do you think would be the challenges of integrating IK in the Geography syllabus at National level?

    Ndezvipi zvibingamupini zvamunofunga kuti zvingasanganwa nazvo pakudziidzisa ruzivo rwechivanhu muzvidziidzo zve Jogirafu padanho reNyika?

11. How can these challenges be overcome for the full implementation of incorporating IK in the teaching of weather and climate?

    Ko zvibingamupini izvi zvingakundikana sei kuti zvidzidzo zvechivanhu zve mamirire ekunze zvifambe zvakanaka?

Research Question 2: How can IK feature in the teaching of the topic on weather and climate at secondary school level?

Mubvunzo weChipiri: Ko ruzivo rwechivanhu rungaburitswa sei pakudziidzisa musoro wenyaya wemamirire ekunze?

1. What indigenous knowledge on weather and climate do you think can feature in the Geography syllabus at secondary school level?

   Nderupi ruzivo rwechivanhu rwemamirire ekunze rwamungafunga kuti rungawedzerwa muzvidziidzo zveJogirafu padanho rekusekondari?

2. Which local knowledge do you practice in your community regarding weather, climate and seasons which you have the feeling that it should be taught to your children in secondary schools?

   Nderupi ruzivo rwechivanhu rwamunoshandisa munharaunda yenyu inechekuita nezvemamiriro ekunze nemwaka zvamunofunga kuti zvinofanirwa kudziidziswa vana mu zvikoro?

3. Which indigenous methods do you use to teach your children at home that could be used by teachers in schools to teach weather and climate?

   Ndedzipi nzira dzechivanhu dzamunoshandisa kudziidzisa vana kudzimba dzenyu dzingashandiswa nevadziidzisi muzvikoro kudziidzisa chidziidzo chemamirire ekunze?

4. What are your views on the integration and teaching of IK on weather and climate in secondary schools?

   Maonero enyu ndeapi papfungwa yekudziidzisa ruzivo rwechivanhu maererano nemamirire ekunze muzvikoro?

5. Of what importance do you think IK on weather and climate would be of value to your community and children if integrated in the Geography syllabus?

   Munofunga kuti zvingabatsira panezvipi munharaunda nekuvana venyu kana ruzivo rwechivanhu rwemamirire ekunze rukadziidziswa murugwaro rweJogirafu?

6. How might this local knowledge on weather and climate be of no importance to your community if integrated in the Geography syllabus?

   Ko ruzivo rwechivanhu rwemamirire ekunze rungatadza kupa rubatsiro munharaunda yenyu nenzira dzipi kana rukadziidziswa murugwaro rweJogirafu?

7. What do you think should be done to preserve this local knowledge on weather and climate which you have?

   Munofunga kuti zvingaitwa sei kuti tichengetedze ruzivo rwechivanhu rwamuinarwo maererano nemamirire ekunze?

8. What are some of the problems you think can be faced if your children are taught your local culture and knowledge in secondary schools?

   Ndeapi matambudziko amunofunga kuti angasangana nevana venyu kana vakadziidziswa ruzivo rwetsika nemagariro echivanhu muzvikoro

Research Question 3: What are the challenges of integrating IK in the teaching of weather and climate?

Mubvunzo weChitatu: Ndezvipi zvibingamupini zvingawanika pakudziidzisa ruzivo rwechivanhu zvemamirire ekunze?

1. As Community elders what challenges do you foresee in an attempt to integrate IK on weather and climate in the Geography syllabus at secondary school level?

   SeVakuru venharaunda ndezvipi zvibingamupini zvamungatarisira pakudziidzisa ruzivo rwechivanhu rwemamiriro ekunze muzvidziidzo zveJogirafu padanho rekusekondari?

2. Do you think the local community have knowledgeable people who can teach indigenous knowledge on weather and climate in secondary schools?

   Pamaonero enyu tine vakuru venharaunda ino here vaneruzivo rwechivanhu pamusoro pemamirire ekunze vangakwanisa kudziidzisa muzvikoro?

3. What are some of the challenges you can experience in an effort to predict weather, seasons and climate using your indigenous methods?

   Ndezvipi zvibingamupini zvamungakwanisa kusangana nazvo pavavariro yenyu yekutiudza zvichaitika pamamiriro ekunze ne mwaka tichishandisa ruzivo rwenyu rwechivanhu?

4. How accurate are your indigenous methods in the study of weather and climate?

   Nzira dzechivanhu dzamunoshandisa kuongorora mamirire ekunze dzine chokwadi zvakadini?

5. What challenges can you experience if requested to teach IK methods on weather and climate to your children in secondary schools?

   Zvimhingamupini zvamunotarisira kusangana nazvo ndezvipi kana mukanzi mushandise nzira dzechivanhu kudziidzisa zvemamiriro ekunze kuvadziidzi vekusekondari?

6. Are there any challenges to your culture and traditions if taught in schools and made public?

Pangave ne zvimhingamupini here kana tsika nemagariro enyu zvikadziidziswa muzvikoro nekuvanhu vose?

7. As Community leaders what are you doing to preserve your cultural heritage regarding weather and climate?

   Imi seVakuru uye Vatungamiri venzvimbo ino pane zvamurikuita here kuchengetedza pfuma yetsika nemagariro edu pamusoro penyaya yemamirire ekunze?

8. What do you think should be done to effectively incorporate the teaching of IK on weather and climate in secondary schools?

   Ndezvipi zvamunofunga kuti zvingaitwe kuti kudziidziswa kweruzivo rwechivanhu maererano nemamiriro ekunze kuti zvifambe zvakanaka kusekondari?

Appendix F: Document Analysis -Geography Syllabus

The following would be examined:

1. Rational for the syllabus
2. Aims of the syllabus
3. Objectives of the syllabus
4. Content covering weather and climate
5. Activities/Methods to teach weather and climate
6. Assessment of taught content on weather and climate.

APPENDIX G (i) INFORMED CONSENT LETTER FOR TEACHERS AND EDUCATIONAL ADMINISTRATORS' INTERVIEWS

University of KwaZulu-Natal,

College of Humanities and Social Sciences

Edgewood Campus

Dear Participant

INFORMED CONSENT LETTER

Study Title: integrating indigenous knowledge into the teaching of weather and climate in Geography in the secondary schools: The case of Manicaland in Zimbabwe

My name is Joshua Risiro. I am a Doctor of Philosophy (Education) PhD student from the School of Education at the University of KwaZulu-Natal, Edgewood campus, South Africa. Part of my studies requires me to interview Teachers and Educational Administrators to establish their views on integrating indigenous knowledge in the teaching of weather and climate at secondary school level. The study focusses on the nature of indigenous knowledge that could be integrated, views of stakeholders on integrating indigenous knowledge in the current Geography syllabus and challenges of integrating this indigenous knowledge in the teaching of weather and climate. You have been selected to be one of the participants in the interviews scheduled for Teachers and Educational Administrators.

Please note that:

- Any information given by you cannot be attributed to you in person or used against you, but will be kept confidential and all participants will remain anonymous. The collected data will be used for purposes of this research only, thus guaranteeing your confidentiality.
- Data gathered from this study will be stored in secure storage by the School of Education and will be destroyed after 5 years if necessary.
- The interviews can last for approximately 30 minutes.
- Participation is voluntary and subjects are free to participate, not participate or stop participating in the research at any time and will not be penalized or victimized in any way for taking such an action.
- Your involvement is purely for academic purposes only, and there are no potential benefits involved from participating in this study, however results from this study will be availed to participants.

- There are no payments or reimbursements of finances for participating in the study.

For further information, I can be contacted at:

Email:jrisiro@gmail.com

Cell: +263775800930.

My supervisor is Prof. Sadhana Manik.She is located at the School of Education, Edgewood Campus, UKZN, South Africa.

Prof. Sadhana. Manik
PhD Supervisor
Email: manik@ukzn.ac.za
Telephone:27312603706

You may also contact the Research Office through:

P. Mohun

HSSREC Research Office,

Tel: 031 260 4557 E-mail: mohunp@ukzn.ac.za

If you are willing to be interviewed, please indicate by ticking, whether or not you are willing to allow the interview to be recorded by the following equipment.

Type of equipment	**Willing**	**Not willing**
Audio equipment		
Photographic equipment		
Video equipment		

DECLARATION

I…… (Full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project. I consent to participating in the interviews on the understanding that my involvement in the study is strictly confidential and anonymous and that the information I will give will be used for purposes of this study only.

I understand that I am also at liberty to withdraw from participating in the study at any given time should I so desire, without fear of any undesirable consequences.

SIGNATURE OF PARTICIPANT **DATE**

…… ……

Thank you for your contribution to this research.

APPENDIX G (ii) TSAMBA YEKUBVUMIRANA-NHAURIRANO NEVADZIIDZISI UYEVAKURU VEZVIKORO

University of KwaZulu-Natal,

College of Humanities and Social Sciences

Edgewood Campus

Wadiwa Mubati

TSAMBA YEKUBVUMIRANA

Musoro wenyaya: Kudziidzisa ruzivo rwechinyakare muzvidziidzo zvemamirire ekunze muchidziidzo che Jogirafu padanho rekusekondari: Ongororo yeManicand muZimbabwe.

Zita rangu ndi Joshua Risiro.Ndirikuita zvidziidzo zvepamusoro zve PHD neUniversity ye KwaZulu-Natal, Edgewood campus, South Africa.Chidimbu chezvidziidzo zvangu ndechekuita nhaurirano neVadziidzisi neVakuru veZvikoro kuona pfungwa dzavo pamusoro pekudziidzisa ruzivo rwechivanhu rwemamirire ekunze padanho rekusekondari. Chidziidzo ichi chakanangana neruzivo rwechivanhu runokwanisa kuiswa muzvidzidzwa, pfungwa dzevanechekuita nezvidziidzo pakudziidzisa ruzivo rwechivanhu padanho rekusekondari uye zvimhingamupini zvingasanganwa nazvo pakudziidzisa ruzivo rwechivanhu rwemamirire ekunze. Imi masarudzwa kuti muve umwe weavo vachaita nhaurirano

Ndapota cherechedzai kuti:

- Masoko ese amuchataura achashandiswa muzvidziidzo zvino chete hakuna kumwe kwaachashandiswa uye haasiri kuzotendekwa kwamuri kana kukupomera mhosva, asi kuti achachengetedzwa uye mazita enyu haasi kuzoburitswa pachena.Mashoko uye ruzivo rwose ruchashandiswa mutsvakuridzo ino chete,zvinove zvinochengetedza ruzivo rwamunenge makurukura.
- Mashoko uye ruzivo rwese zvichaunganidzwa mutsvakuridzo ino zvichachengetedzwa pakawanzika muChikoro cheDziidzo uye zvinogona kuparadzwa mushure memakore mashanu kana zvichikodzera.
- Nhaurirano iyi inogona kupedza nguva ingangoita maminetsi makumi matatu.
- Munesarudzo yekuita nhaurirano yetsvakuridzo iyi kana kuregedza neipi zvayo nguva uye musingapiwi mhoswa nekuregedza kwamunenge maita.

- Kubatsira kwenyu patsvakuridzo iyi ndekwekuti chidziidzo ichi chibudirire chete, hapana mubhadharo wemari kana zvimwewo. Zvakadaro zvazvo ruzivo runenge rwabuda mutsvakuridzo iyi zvichaziviswa vanenge vakabatsira mutsvakuridzo iyi.
- Hapana mubhadharo kana muripo pakubatsira mutsvakuridzo iyi.

Kana paine zvimwe zvamungada kuziva, makasununguka kundibata pa:

Email:jrisiro@gmail.com

Cell: +263775800930.

Mudziidzisi wangu ndi Prof.Sadhana Manik.Vanowanikwa paUnivhesiti yedziidzo yeEdgewood, UKZN, munyika yeSouth Africa.

Prof. Sadhana. Manik
PhD Supervisor
Email: manik@ukzn.ac.za
Telephone: 27312603706

Hofisi yetsvakuridzo paUKZN munogona kuibata kana paine zvimwe zvamungada kubvunza. Munogonazve kubata Hofisi yetsvakuridzo pa:

P. Mohun

HSSREC Research Office,

Tel: 031 260 4557 E-mail: mohunp@ukzn.ac.za

Kana makasununguka kuita nhaurirano iyi, ndinokumbira kuti muratidze kusununguka kana kusasununguka kwenyu kuita nhaurirano iyi ichitapwa nemichina inotevera:

Rudzi rwemuchina	**Ndakasununguka**	**Handina Kusununguka**
Muchina wemanzwi		
Muchina wemapikicha		
Muchina wemanzwi nemapikicha		

DECLARATION

Ini…… (Zita rakadzara) ndinonzwisisa zvirimugwaro rino uye chimiro chetsvakurudzo ino. Ndinobvuma kuita nhaurirano iyi ndichinzwisisa kuti masoko andichataura achashandiswa muzvidziidzo zvino chete hakuna kumwe kwaachashandiswa.

Ndinonzwisisa kuti ndakasununguka kuregedza kupa pfungwa dzangu muchidziidzo chino neipi zvayo nguva, pasina kutya matambudziko angawanikwa nekuregedza kwangu.

SIGNATURE OF PARTICIPANT **ZUVA**

…… **……**

Ndinotenda nerubatsiro rwamapa mutsvakuridzo ino

APPENDIX H (i) INFORMED CONSENT LETTER FOR COMMUNITY ELDERS' INTERVIEWS

University of KwaZulu-Natal,

College of Humanities and Social Sciences

Edgewood Campus

Dear Participant

INFORMED CONSENT LETTER

Study Title: integrating IK into the teaching of weather and climate in Geography in the secondary schools: The case of Manicaland in Zimbabwe

My name is Joshua Risiro. I am a Doctor of Philosophy (Education) PhD student from the School of Education at the University of KwaZulu-Natal, Edgewood campus, South Africa. Part of my studies requires me to interview community elders to establish their views on integrating indigenous knowledge in the teaching of weather and climate at secondaryschool level. The study focus on the nature of indigenous knowledge that could be integrated, views of stakeholders on integrating indigenous knowledge in the current Geography syllabus and challenges of integrating this indigenous knowledge in the teaching of weather and climate. You have been selected to be one of the participants in the interviews scheduled for community elders.

Please note that:

- Any information given by you cannot be attributed to you in person or used against you, but will be kept confidential and all participants will remain anonymous. The collected data will be used for purposes of this research only, thus guaranteeing your confidentiality.
- Data gathered from this study will be stored in secure storage by the School of Education and will be destroyed after 5 years if necessary.
- The interviews can last for approximately 30 minutes.
- Participation is voluntary and subjects are free to participate, not participate or stop participating in the research at any time and will not be penalized or victimized in any way for taking such an action.

- Your involvement is purely for academic purposes only, and there are no potential benefits involved from participating in this study, however results from this study will be availed to participants.
- There are no payments or reimbursements of finances for participating in the study.

For further information, I can be contacted at:

Email:jrisiro@gmail.com

Cell: +263775800930.

My supervisor is Prof. Sadhana Manik.She is located at the School of Education, Edgewood Campus, UKZN, South Africa.

Prof. Sadhana. Manik
PhD Supervisor
Email: manik@ukzn.ac.za
Telephone:27312603706

You may also contact the Research Office through:

P. Mohun

HSSREC Research Office,

Tel: 031 260 4557 E-mail: mohunp@ukzn.ac.za

If you are willing to be interviewed, please indicate by ticking, whether or not you are willing to allow the interview to be recorded by the following equipment.

Type of equipment	**Willing**	**Not willing**
Audio equipment		
Photographic equipment		
Video equipment		

DECLARATION

I…… (Full names of participant) hereby confirm that I understand the contents of this document and the nature of

the research project. I consent to participating in the interviews on the understanding that my involvement in the study is strictly confidential and anonymous and that the information I will give will be used for purposes of this study only.

I understand that I am also at liberty to withdraw from participating in the study at any given time should I so desire, without fear of any undesirable consequences.

SIGNATURE OF PARTICIPANT **DATE**

…… ……

Thank you for your contribution to this research.

APPENDIX H (ii) TSAMBA YEKUBVUMIRANA-NHAURIRANO NEVAKURU VENZVIMBO

University of KwaZulu-Natal,

College of Humanities and Social Sciences

Edgewood Campus

Wadiwa Mubati

TSAMBA YEKUBVUMIRANA

Musoro wenyaya: Kudziidzisa ruzivo rwechinyakare muzvidziidzo zvemamirire ekunze muchidziidzo che Jogirafu padanho rekusekondari: Ongororo yeManicand muZimbabwe.

Zita rangu ndi Joshua Risiro.Ndirikuita zvidziidzo zvepamusoro zve PHD neUniversity ye KwaZulu-Natal, Edgewood campus, South Africa.Chidimbu chezvidziidzo zvangu ndechekuita nhaurirano neVakuru venzvimbo kuona pfungwa dzavo pamusoro pekudziidzisa ruzivo rwechivanhu rwemamirire ekunze padanho rekusekondari. Chidziidzo ichi chakanangana neruzivo rwechivanhu runokwanisa kuiswa muzvidzidzwa, pfungwa dzevanechekuita nezvidziidzo pakudziidzisa ruzivo rwechivanhu padanho rekusekondari uye zvimhingamupini zvingasanganwa nazvo pakudziidzisa ruzivo rwechivanhu rwemamirire ekunze. Imi masarudzwa kuti muve umwe weavo vachaita nhaurirano neVakuru venharaunda.

Ndapota cherechedzai kuti:

- Masoko ese amuchataura achashandiswa muzvidziidzo zvino chete hakuna kumwe kwaachashandiswa uye haasiri kuzotendekwa kwamuri kana kukupomera mhosva, asi kuti achachengetedzwa uye mazita enyu haasi kuzoburitswa pachena. Mashoko uye ruzivo rwose ruchashandiswa mutsvakuridzo ino chete, zvinove zvinochengetedza ruzivo rwamunenge makurukura.
- Mashoko uye ruzivo rwese zvichaunganidzwa mutsvakuridzo ino zvichachengetedzwa pakawanzika muChikoro cheDziidzo uye zvinogona kuparadzwa mushure memakore mashanu kana zvichikodzera.
- Nhaurirano iyi inogona kupedza nguva ingangoita maminetsi makumi matatu.
- Munesarudzo yekuita nhaurirano yetsvakuridzo iyi kana kuregedza neipi zvayo nguva uye musingapiwi mhoswa nekuregedza kwamunenge maita.

- Kubatsira kwenyu patsvakuridzo iyi ndekwekuti chidziidzo ichi chibudirire chete, hapana mubhadharo wemari kana zvimwew, zvakadaro zvazvo ruzivo runenge rwabuda mutsvakuridzo iyi zvichaziviswa vanenge vakabatsira mutsvakuridzo iyi.
- Hapana mubhadharo kana muripo pakubatsira mutsvakuridzo iyi.

Kana paine zvimwe zvamungada kuziva, makasununguka kundibata pa:

Email:jrisiro@gmail.com

Cell: +263775800930.

Mudziidzisi wangu ndi Prof. Sadhana Manik.Vanowanikwa paUnivhesiti yedziidzo yeEdgewood, UKZN, munyika yeSouth Africa.

Prof. Sadhana. Manik
PhD Supervisor
Email: manik@ukzn.ac.za
Telephone: 27312603706

Hofisi yetsvakuridzo paUKZN munogona kuibata kana paine zvimwe zvamungada kubvunza. Munogonazve kubata Hofisi yetsvakuridzo pa:

P. Mohun

HSSREC Research Office,

Tel: 031 260 4557 E-mail: mohunp@ukzn.ac.za

Kana makasununguka kuita nhaurirano iyi, ndinokumbira kuti muratidze kusununguka kana kusasununguka kwenyu kuita nhaurirano iyi ichitapwa nemichina inotevera:

Rudzi rwemuchina	**Ndakasununguka**	**Handina Kusununguka**
Muchina wemanzwi		

Muchina wemapikicha		
Muchina wemanzwi nemapikicha		

DECLARATION

Ini……(Zita rakadzara) ndinonzwisisa zvirimugwaro rino uye chimiro chetsvakurudzo ino.Ndinobvuma kuita nhaurirano iyi ndichinzwisisa kuti masoko andichataura achashandiswa muzvidziidzo zvino chete hakuna kumwe kwaachashandiswa.

Ndinonzwisisa kuti ndakasununguka kuregedza kupa pfungwa dzangu muchidziidzo chino neipi zvayo nguva, pasina kutya matambudziko angawanikwa nekuregedza kwangu.

SIGNATURE OF PARTICIPANT **ZUVA**

…… **……**

Ndinotenda nerubatsiro rwamapa mutsvakuridzo ino

APPENDIX I (i) INFORMED CONSENT LETTER FOR TEACHERS'S FOCUS GROUP

University of KwaZulu-Natal,

College of Humanities and Social Sciences

Edgewood Campus

Dear Participant

INFORMED CONSENT LETTER

Study Title: integrating IK into the teaching of weather and climate in Geography in the secondary schools: The case of Manicaland in Zimbabwe

My name is Joshua Risiro. I am a Doctor of Philosophy (Education) PhD student from the School of Education at the University of KwaZulu-Natal, Edgewood campus, South Africa. Part of my studies requires me to carry out focus group discussion with Teachers to establish their views on integrating indigenous knowledge in the teaching of weather and climate at secondary school level. The study focusses on the nature of IK that could be integrated, views of stakeholders on integrating IK in the current Geography syllabus and challenges of integrating this IK in the teaching of weather and climate. You have been selected to be one of the participants in the focus group discussion scheduled for Teachers.

Please note that:

- Any information given by you cannot be attributed to you in person or used against you, but will be kept confidential and all participants will remain anonymous. The collected data will be used for purposes of this research only, thus guaranteeing your confidentiality.
- Data gathered from this study will be stored in secure storage by the School of Education and will be destroyed after 5 years if necessary.
- The focus group discussion can last for approximately 30 minutes.
- Participation is voluntary and subjects are free to participate, not participate or stop participating in the research at any time and will not be penalized or victimized in any way for taking such an action.
- Your involvement is purely for academic purposes only, and there are no potential benefits involved from participating in this study, however results from this study will be availed to participants.

- There are no payments or reimbursements of finances for participating in the study.

For further information, I can be contacted at:

Email:jrisiro@gmail.com

Cell: +263775800930.

My supervisor is Prof. Sadhana Manik.She is located at the School of Education, Edgewood Campus, UKZN, South Africa.

Prof.SadhanaManik
PhD Supervisor
Email: manik@ukzn.ac.za Telephone:2603706

You may also contact the Research Office through:

P. Mohun

HSSREC Research Office,

Tel: 031 260 4557 E-mail: mohunp@ukzn.ac.za

If you are willing to engage in the focus group discussion, please indicate by ticking, whether or not you are willing to allow the discussion to be recorded by the following equipment:

Type of equipment	**Willing**	**Not willing**
Audio equipment		
Photographic equipment		
Video equipment		

DECLARATION

I…… (Full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project. I consent to participating in the interviews on the understanding that my involvement in the study is strictly confidential and anonymous and that the information I will give will be used for purposes of this study only.

I understand that I am also at liberty to withdraw from participating in the study at any given time should I so desire, without fear of any undesirable consequences.

SIGNATURE OF PARTICIPANT **DATE**

…… ……

Thank you for your contribution to this research.

APPENDIX I (ii) TSAMBA YEKUBVUMIRANA NEVADZIIDZISI MUNHAURIRANO YE MUZVIKWATA

University of KwaZulu-Natal,

College of Humanities and Social Sciences

Edgewood Campus

Wadiwa Mubati

TSAMBA YEKUBVUMIRANA

Musoro wenyaya: Kudziidzisa ruzivo rwechinyakare muzvidziidzo zvemamirire ekunze muchidziidzo che Jogirafu padanho rekusekondari: Ongororo yeManicand muZimbabwe.

Zita rangu ndi Joshua Risiro.Ndirikuita zvidziidzo zvepamusoro zve PHD neUniversity ye KwaZulu-Natal, Edgewood campus, South Africa.Chidimbu chezvidziidzo zvangu ndechekuita nhaurirano muzvikwata neVadziidzisi kuona pfungwa dzavo pamusoro pekudziidzisa ruzivo rwechivanhu rwemamirire ekunze padanho rekusekondari. Chidziidzo ichi chakanangana neruzivo rwechivanhu runokwaniswa kuiswa muzvidzidzwa, pfungwa dzevanechekuita nezvidziidzo pakudziidzisa ruzivo rwechivanhu padanho rekusekondari uye zvimhingamupini zvingasanganwa nazvo pakudziidzisa ruzivo rwechivanhu rwemamirire ekunze. Imi masarudzwa kuti muve umwe weavo vachaita nhaurirano muzvikwata zveVadziidzisi.

Ndapota cherechedzai kuti:

- Masoko ese amuchataura achashandiswa muzvidziidzo zvino chete hakuna kumwe kwaachashandiswa uye haasiri kuzotendekwa kwamuri kana kukupomera mhosva, asi kuti achachengetedzwa uye mazita enyu haasi kuzoburitswa pachena.Mashoko uye ruzivo rwose ruchashandiswa mutsvakuridzo ino chete,zvinove zvinochengetedza ruzivo rwamunenge makurukura.
- Mashoko uye ruzivo rwese zvichaunganidzwa mutsvakuridzo ino zvichachengetedzwa pakawanzika muChikoro cheDziidzo uye zvinogona kuparadzwa mushure memakore mashanu kana zvichikodzera.
- Nhaurirano iyi inogona kupedza nguva ingangoita maminetsi makumi matatu.

- Munesarudzo yekuita nhaurirano yetsvakuridzo iyi kana kuregedza neipi zvayo nguva uye musingapiwi mhoswa nekuregedza kwamunenge maita.
- Kubatsira kwenyu patsvakuridzo iyi ndekwekuti chidziidzo ichi chibudirire chete, hapana mubhadharo wemari kana zvimwewo Zvakadaro zvazvo ruzivo runenge rwabuda mutsvakuridzo iyi zvichaziviswa vanenge vakabatsira mutsvakuridzo iyi.
- Hapana mubhadharo kana muripo pakubatsira mutsvakuridzo iyi.

Kana paine zvimwe zvamungada kuziva, makasununguka kundibata pa:

Email:jrisiro@gmail.com

Cell: +263775800930.

Mudziidzisi wangu ndi Prof.Sadhana Manik.Vanowanikwa paUnivhesiti yedziidzo yeEdgewood, UKZN, munyika yeSouth Africa.

Prof. Sadhana. Manik
PhD Supervisor
Email: manik@ukzn.ac.za
Telephone: 27312603706

Hofisi yetsvakuridzo paUKZN munogona kuibata kana paine zvimwe zvamungada kubvunza. Munogonazve kubata Hofisi yetsvakuridzo pa:

P. Mohun

HSSREC Research Office,

Tel: 031 260 4557 E-mail: mohunp@ukzn.ac.za

Kana makasununguka kuita nhaurirano iyi muchikwata, ndinokumbira kuti muratidze kusununguka kana kusasununguka kwenyu kuita nhaurirano iyi ichitapwa nemichina inotevera:

Rudzi rwemuchina	**Ndakasununguka**	**Handina Kusununguka**
Muchina wemanzwi		
Muchina wemapikicha		
Muchina wemanzwi nemapikicha		

DECLARATION

Ini…… (Zita rakadzara) ndinonzwisisa zvirimugwaro rino uye chimiro chetsvakurudzo ino.Ndinobvuma kuita nhaurirano iyi ndichinzwisisa kuti masoko andichataura achashandiswa muzvidziidzo zvino chete hakuna kumwe kwaachashandiswa.

Ndinonzwisisa kuti ndakasununguka kuregedza kupa pfungwa dzangu muchidziidzo chino neipi zvayo nguva, pasina kutya matambudziko angawanikwa nekuregedza kwangu.

SIGNATURE OF PARTICIPANT **ZUVA**

…… **……**

Ndinotenda nerubatsiro rwamapa mutsvakuridzo ino.

APPENDIX J (i) INFORMED CONSENT LETTER FOR COMMUNITY ELDERS' FOCUS GROUP

University of KwaZulu-Natal,

College of Humanities and Social Sciences

Edgewood Campus

Dear Participant

INFORMED CONSENT LETTER

Study Title: integrating IK into the teaching of weather and climate in Geography in the secondary schools: The case of Manicaland in Zimbabwe

My name is Joshua Risiro. I am a Doctor of Philosophy (Education) PhD student from the School of Education at the University of KwaZulu-Natal, Edgewood campus, South Africa. Part of my studies requires me to carry out focus group discussion with Community elders to establish their views on integrating IK in the teaching of weather and climate at secondary school level. The study focusses on the nature of indigenous knowledge that could be integrated, views of stakeholders on integrating indigenous knowledge in the current Geography syllabus and challenges of integrating this indigenous knowledge in the teaching of weather and climate. You have been selected to be one of the participants in the focus group discussion scheduled for Community elders.

Please note that:

- Any information given by you cannot be attributed to you in person or used against you, but will be kept confidential and all participants will remain anonymous. The collected data will be used for purposes of this research only, thus guaranteeing your confidentiality.
- Data gathered from this study will be stored in secure storage by the School of Education and will be destroyed after 5 years if necessary.
- The focus group discussion can last for approximately 30 minutes.
- Participation is voluntary and subjects are free to participate, not participate or stop participating in the research at any time and will not be penalized or victimized in any way for taking such an action.

- Your involvement is purely for academic purposes only, and there are no potential benefits involved from participating in this study, however results from this study will be availed to participants.
- There are no payments or reimbursements of finances for participating in the study.

For further information, I can be contacted at:

Email:jrisiro@gmail.com

Cell: +263775800930.

My supervisor is Prof. Sadhana Manik.She is located at the School of Education, Edgewood Campus, UKZN, South Africa.

Prof. Sadhana. Manik
PhD Supervisor
Email: manik@ukzn.ac.za
Telephone: 27312603706

The research office at UKZN can also be contacted for any queries.
You may also contact the Research Office through:

P. Mohun

HSSREC Research Office,

Tel: 031 260 4557 E-mail: mohunp@ukzn.ac.za

If you are willing to engage in the focus group discussion, please indicate by ticking, whether or not you are willing to allow the discussion to be recorded by the following equipment:

Type of equipment	**Willing**	**Not willing**
Audio equipment		
Photographic equipment		
Video equipment		

DECLARATION

I…… (Full names of participant) hereby confirm that I understand the contents of this document and the nature of

the research project. I consent to participating in the interviews on the understanding that my involvement in the study is strictly confidential and anonymous and that the information I will give will be used for purposes of this study only.

I understand that I am also at liberty to withdraw from participating in the study at any given time should I so desire, without fear of any undesirable consequences.

SIGNATURE OF PARTICIPANT **DATE**

…… **……**

Thank you for your contribution to this research.

APPENDIX J (ii) TSAMBA YEKUBVUMIRANA-MIBVUNZO YEMUZVIKWATA NEVAKURU VENZVIMBO

University of KwaZulu-Natal,

College of Humanities and Social Sciences

Edgewood Campus

Wadiwa Mubati

TSAMBA YEKUBVUMIRANA

Musoro wenyaya: Kudziidzisa ruzivo rwechinyakare muzvidziidzo zvemamirire ekunze muchidziidzo che Jogirafu padanho rekusekondari: Ongororo yeManicand muZimbabwe.

Zita rangu ndi Joshua Risiro.Ndirikuita zvidziidzo zvepamusoro zve PHD neUniversity ye KwaZulu-Natal, Edgewood campus, South Africa.Chidimbu chezvidziidzo zvangu ndechekuita nhaurirano muzvikwata neVakuru venzvimbo kuona pfungwa dzavo pamusoro pekudziidzisa ruzivo rwechivanhu rwemamirire ekunze padanho rekusekondari. Chidziidzo ichi chakanangana neruzivo rwechivanhu runokwaniswa kuiswa muzvidzidzwa, pfungwa dzevanechekuita nezvidziidzo pakudziidzisa ruzivo rwechivanhu padanho rekusekondari uye zvimhingamupini zvingasanganwa nazvo pakudziidzisa ruzivo rwechivanhu rwemamirire ekunze. Imi masarudzwa kuti muve umwe weavo vachaita nhaurirano muzvikwata zveVakuru venharaunda.

Ndapota cherechedzai kuti:

- Masoko ese amuchataura achashandiswa muzvidziidzo zvino chete hakuna kumwe kwaachashandiswa uye haasiri kuzotendekwa kwamuri kana kukupomera mhosva, asi kuti achachengetedzwa uye mazita enyu haasi kuzoburitswa pachena.Mashoko uye ruzivo rwose ruchashandiswa mutsvakuridzo ino chete,zvinove zvinochengetedza ruzivo rwamunenge makurukura.
- Mashoko uye ruzivo rwese zvichaunganidzwa mutsvakuridzo ino zvichachengetedzwa pakawanzika muChikoro cheDziidzo uye zvinogona kuparadzwa mushure memakore mashanu kana zvichikodzera.

- Nhaurirano iyi inogona kupedza nguva ingangoita maminetsi makumi matatu.
- Munesarudzo yekuita nhaurirano yetsvakuridzo iyi kana kuregedza neipi zvayo nguva uye musingapiwi mhoswa nekuregedza kwamunenge maita.
- Kubatsira kwenyu patsvakuridzo iyi ndekwekuti chidziidzo ichi chibudirire chete, hapana mubhadharo wemari kana zvimwew, zvakadaro zvazvo ruzivo runenge rwabuda mutsvakuridzo iyi zvichaziviswa vanenge vakabatsira mutsvakuridzo iyi.
- Hapana mubhadharo kana muripo pakubatsira mutsvakuridzo iyi.

Kana paine zvimwe zvamungada kuziva, makasununguka kundibata pa:

Email:jrisiro@gmail.com

Cell: +263775800930.

Mudziidzisi wangu ndi Prof.Sadhana Manik.Vanowanikwa paUnivhesiti yedziidzo yeEdgewood, UKZN, munyika yeSouth Africa.

Prof. Sadhana. Manik
PhD Supervisor
Email: manik@ukzn.ac.za
Telephone: 27312603706

Hofisi yetsvakuridzo paUKZN munogona kuibata kana paine zvimwe zvamungada kubvunza. Munogonazve kubata Hofisi yetsvakuridzo pa:

P. Mohun

HSSREC Research Office,

Tel: 031 260 4557 E-mail: mohunp@ukzn.ac.za

Kana makasununguka kuita nhaurirano iyi muchikwata, ndinokumbira kuti muratidze kusununguka kana kusasununguka kwenyu kuita nhaurirano iyi ichitapwa nemichina inotevera:

Rudzi rwemuchina	**Ndakasununguka**	**Handina Kusununguka**
Muchina wemanzwi		
Muchina wemapikicha		
Muchina wemanzwi nemapikicha		

DECLARATION

Ini…… (Zita rakadzara) ndinonzwisisa zvirimugwaro rino uye chimiro chetsvakurudzo ino. Ndinobvuma kuita nhaurirano iyi ndichinzwisisa kuti masoko andichataura achashandiswa muzvidziidzo zvino chete hakuna kumwe kwaachashandiswa.

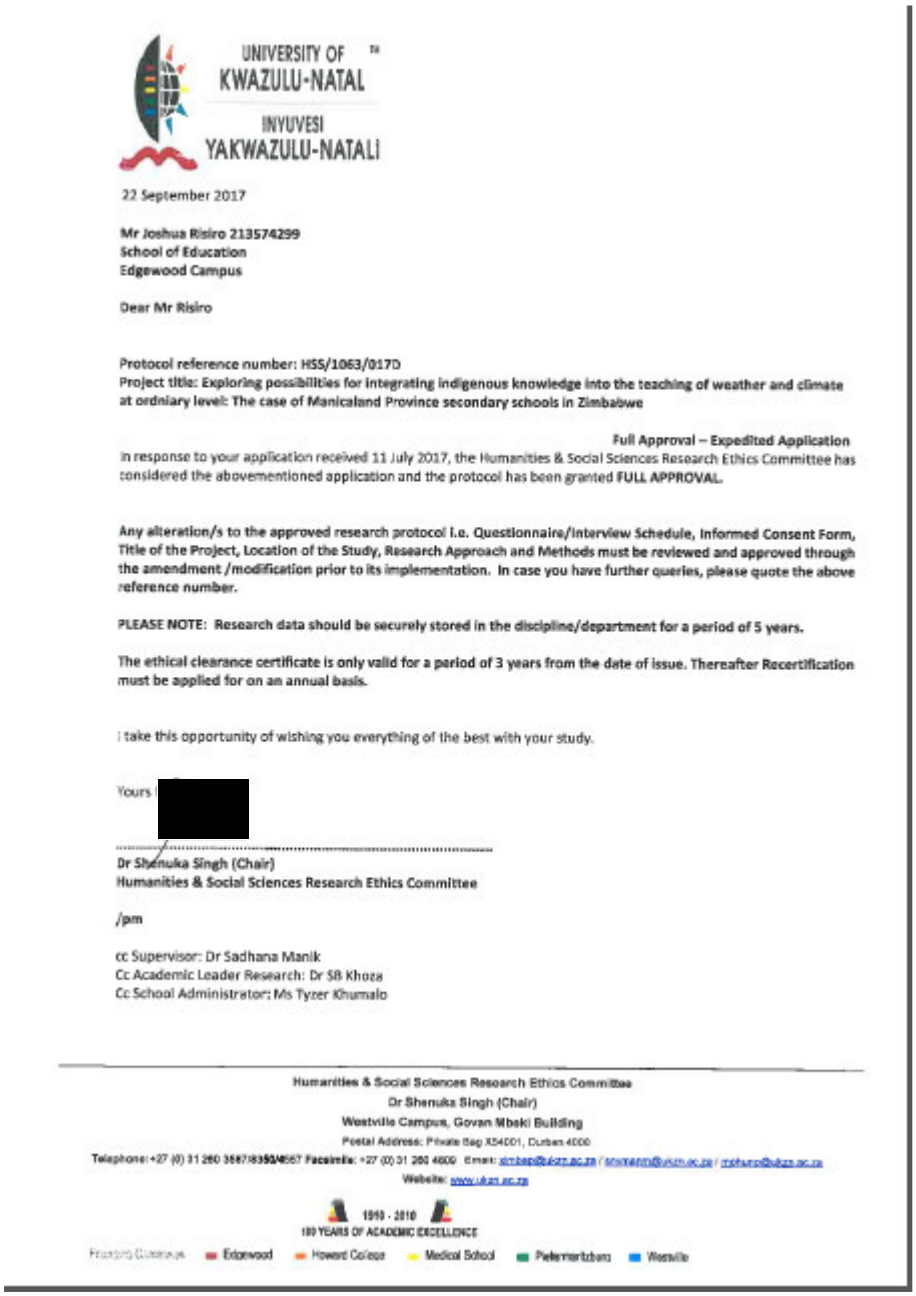
Ndinonzwisisa kuti ndakasununguka kuregedza kupa pfungwa dzangu muchidziidzo chino neipi zvayo nguva, pasina kutya matambudziko angawanikwa nekuregedza kwangu.

SIGNATURE OF PARTICIPANT **ZUVA**

…… **……**

Ndinotenda nerubatsiro rwamapa mutsvakuridzo ino

APPENDIX K: ETHICAL CLEARANCE FULL APPROVAL LETTER



UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

22 September 2017

Mr Joshua Risiro 213574299
School of Education
Edgewood Campus

Dear Mr Risiro

Protocol reference number: HSS/1063/017D
Project title: Exploring possibilities for integrating indigenous knowledge into the teaching of weather and climate at ordinary level: The case of Manicaland Province secondary schools in Zimbabwe

Full Approval – Expedited Application

In response to your application received 11 July 2017, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours [redacted]

Dr Shenuka Singh (Chair)
Humanities & Social Sciences Research Ethics Committee

/pm

cc Supervisor: Dr Sadhana Manik
Cc Academic Leader Research: Dr SB Khoza
Cc School Administrator: Ms Tyzer Khumalo

Humanities & Social Sciences Research Ethics Committee
Dr Shenuka Singh (Chair)
Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X54001, Durban 4000
Telephone: +27 (0) 31 260 3587/8350/8567 **Facsimile:** +27 (0) 31 260 4609 Email: [redacted]
Website: www.ukzn.ac.za

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APPENDIX L: PERMISSION LETTER- MINISTRY OF PRIMARY AND SECONDARY EDUCATION

"The Secretary for Primary and Secondary Education"
Telephone: 799914 and 705153
Telegraphic address : "EDUCATION"
Fax: 791923

ZIMBABWE

Ministry of Primary and Secondary Education
P.O Box CY 121
Causeway
ZIMBABWE

24 March 2016

Joshua Risiro
Great Zimbabwe University
P. O. Box 1235
Masvingo

RE: PERMISSION TO CARRY OUT RESEARCH IN MANICALAND PROVINCE: SECONDARY SCHOOLS

Reference is made to your application to carry out a research in the secondary schools Manicaland Province on the research title:

"INTEGRATING INDIGENIOUS KNOWLEDGE OF WEATHER AND CLIMATE AT ORDINARY LEVEL: A CASE OF MANICALAND PROVINCE SECONDARY SCHOOLS IN ZIMBABWE"

Permission is hereby granted. However, you are required to liaise with the Provinci Education Director Manicaland, who is responsible for the secondary schools which yc want to involve in your research.

You are required to provide a copy of your final report to the Secretary for Primary ar Secondary Education.

[redacted]

E. Chinyowa
Acting Director: Policy Planning, Research and Statistics
For: **SECRETARY FOR PRIMARY AND SECONDARY EDUCATION**
cc: PED – Manicaland Province
r/amkwala16

APPENDIX M: PERMISSION LETTER- MINISTRY OF PRIMARY AND SECONDARY EDUCATION- MANICALAND PROVINCE

All communications should be addressed to "The Secretary for Primary and Secondary Education"
Telephone: 799914 and 705153
Telegraphic address : "EDUCATION"
Fax: 791923

ZIMBABWE

Reference: C/426/3 Manicaland
Ministry of Primary and
Secondary Education
P.O Box CY 121
Causeway
ZIMBABWE

24 March 2016

Joshua Risiro
Great Zimbabwe University
P. O. Box 1235
Masvingo

RE: PERMISSION TO CARRY OUT RESEARCH IN MANICALAND PROVINCE: SECONDARY SCHOOLS

Reference is made to your application to carry out a research in the secondary schools in Manicaland Province on the research title:

"INTEGRATING INDIGENIOUS KNOWLEDGE OF WEATHER AND CLIMATE AT ORDINARY LEVEL: A CASE OF MANICALAND PROVINCE SECONDARY SCHOOLS IN ZIMBABWE"

Permission is hereby granted. However, you are required to liaise with the Provincial Education Director Manicaland, who is responsible for the secondary schools which you want to involve in your research.

You are required to provide a copy of your final report to the Secretary for Primary and Secondary Education.

[redacted]

E. Chinyowa
Acting Director: Policy Planning, Research and Statistics
For: **SECRETARY FOR PRIMARY AND SECONDARY EDUCATION**
cc: PED – Manicaland Province
r/amkwala16

MINISTRY OF EDUCATION
(PROFESSIONAL ADMINISTRATION)
11/4/17
MANICALAND
P.O. BOX 146, MUTARE

DSI Manicaland
Please assist.

APPENDIX N: PERMISSION LETTER- MINISTRY OF RURAL DEVELOPMENT, PROMOTION AND PRESERVATION OF NATIONAL CULTURE AND HERITAGE

Ministry of Rural Development, Promotion and Preservation of National Culture and Heritage

Correspondence should not be addressed to individuals

ZIMBABWE

Office of the Provincial Administrator
(Manicaland)
Box 535
Mutare

Telephone: 020-62514, 62589, 62594
Telefax: 020-63726,
Email: pamanicaland@gmail.com.zw

Reference: C/37

11 September 2017

The District Administrator
Buhera
Chipinge
Chimanimani
Mutare
Makoni
Mutasa
Nyanga

Re: **AUTHORITY TO CARRY OUT EDUCATIONAL RESEARCH ON GEOGRAPHICAL INDIGENOUS KNOWLEDGE: JOSHUA RISIRO: GREAT ZIMBABWE UNIVERSITY**

The above subject refers.

Authority has been granted to Mr. Joshua Risiro (I.D. No 44-034841 G 44) a doctorate student (No 213574299) with the University of KwaZulu-Natal in South Africa. He is a lecturer at the Great Zimbabwe University. His cell number is 0775800920.

Kindly facilitate his interaction with communities in your district. He will meet people at household level.

Prov. Administrator-Manicaland
Min. of Rural Dev., Promotion
Preservation of Nat. Culture & Heritage
11 SEP 2017
P.O. BOX 535, MUTARE
ZIMBABWE TEL: 020-62514

[redacted]

Scenza E.
PROVINCIAL ADMINISTRATOR
MANICALAND

Copy : Hon. Minister of State for Provincial Affairs
: President Dept – Attention Mrs Kanda
: Proposal, Manicaland
: PA's file
: RF

1

APPENDIX O: TURNITIN REPORT

Turnitin Originality Report

Processed on: 02-Dec-2019 10:25 PM CAT
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Joshua Risiro PhD Thesis By Joshua Risiro

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