

**Indigenous knowledge and infectious diseases: Rethinking the teacher education  
Biology curriculum**

**By**

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## DECLARATION

I, Kutenda Trinos (220108403) declare that:

- i. The research reported in this thesis except where otherwise indicated is my original work.
- ii. This thesis has not been submitted for any degree or examination at any university.
- iii. This thesis does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from those persons.
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  - a. The words have been re-written but the general information attributed to the author(s) has been acknowledged; and
  - b. Where the exact words have been used, they have been placed within quotation marks, and referenced accordingly.
- v. The work described in this thesis was carried out in the Science and Technology Cluster, School of Education, University of KwaZulu-Natal, from January 2020 to November 2022 under the supervision of Professor Ronicka Mudaly.
- vi. Ethical clearance (Protocol HSSREC/00001877/2020) was granted prior to undertaking the fieldwork.

Signed: Mr Kutenda Trinos: \_\_\_\_\_ Date: 2022/12/20

As the candidate's supervisor I, Professor Ronicka Mudaly, agree to the submission of this thesis.

Signed: Professor R. Mudaly: \_\_\_\_\_ Date: \_\_\_\_\_

**DEDICATION**

This work is dedicated to my mother Kireni Gegege Siziba and my late father Mukuvo Trinos Zimuto, from whom I learned all my work ethics. To my late father, you left us so early, I wish you could be alongside your granddaughters celebrating this achievement. May your spirit continue to guide us!

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Finally, I sincerely thank all the participants for taking their time to participate in my study. I am forever grateful for all of your contributions to this study.

## **ABSTRACT**

In most African countries, the ontological and epistemological standard that shapes university curricula is a pre-programmed Euro-Western educational model. This is true regardless of the fact that most African countries gained their independence many decades ago. African countries pride themselves on political independence rather than epistemological and ontological autonomy. The legacy of socio-political histories has resulted in indigenous knowledge of Africa to continue to be despised. This coloniality underpins the intellectual colonialism which is evident in the marginalisation of indigenous knowledge systems and their community sages in formal education currently. This has been normalised and accepted as the default setting because the colonised have learned to live with an alien curriculum. Consequently, this contributed to the dearth of African indigenous scholarship and the erosion of the indigenous knowledge base as globalisation, modernity, urbanisation, and technological advancement come to the fore.

This study selectively explored part of the university curriculum by examining content knowledge and pedagogical approaches in four Biology modules for pre-service teachers, relative to a specific field, namely, infectious diseases, at Midlands State University in Zimbabwe. The study also sought to identify knowledge of infectious diseases and the practises of Karanga healers and to suggest how these could be integrated into the Biology curriculum for pre-service teachers. The study was motivated by the lack of contextualisation in science education which is perpetuated by privileging a predominantly Euro-Western university curriculum.

In order to peer through the decolonial lens that promotes indigenisation of science modules, semi-structured interviews were conducted with ten Karanga healers to understand indigenous knowledge of infectious diseases. Exploration of main themes revealed that

disease management is seen in terms of causes of infections, diagnosis, prevention and treatment, and traditional health education to promote a disease-free community. The knowledge shared by the Karanga healers illuminated the holistic perspective of indigenous Africans on health, from both the physical and spiritual perspectives.

The study also examined the nature of four health-related modules for Biology pre-service teachers and found that the Euro-Western worldview dominated over the African-Indigenous worldview. Therefore, the content and pedagogy that shaped and continue to shape these modules are predominantly Euro-Western. A comparison of the two knowledge systems reveals points of dissonance and concurrence.

Synthesis of research data revealed gaps, connections, and opportunities through which indigenous knowledge can be integrated into Biology modules. Using an emancipatory approach situated within the critical paradigm, the study developed practical transformational approaches rooted in promoting a poly-epistemic university curriculum. The study proposed an integrative curriculum model informed by the need to give students the opportunity to reflect on their formal learning experiences against their lived experiences. In this way work towards an inclusive curriculum and inclusive pedagogy could be achieved.

## **KEYWORDS**

Indigenous knowledge, decoloniality, critical pedagogy, coloniality

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**LIST OF ACRONYMS AND ABBREVIATIONS**

AIKS	African Indigenous Knowledge Systems
CP	Critical Pedagogy
FGIs	Focus Group Interviews
ICT	Information Communication Technologies
IK	Indigenous Knowledge
IKS	Indigenous Knowledge Systems
KHs	Karanga Healers
MSU	Midlands State University
PST	Pre-service teacher
UKZN	University of Kwa Zulu Natal
WHO	World Health Organisation

**CHAPTER 1****ORIENTATION OF THE STUDY**

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## **1.1 Background and introduction to the study**

Globally there are different philosophical orientations upon which health narratives can be mirrored. From an African perspective health and disease management are informed by the biomedical and indigenous knowledge perspectives that sometimes do not coincide. The biomedical perspective has been established and developed primarily in the scientific health system of the Euro-Western ambit, whereas the indigenous knowledge (IK) perspective is rooted in indigenous traditions and practices of a particular group of people. Despite the subjugation and displacement of African indigenous knowledge (AIK) in the wake of colonisation, indigenous health practices are still used to combat disease in Africa (Mokgobi, 2014).

Health practices that many Africans adhere to are often marginalised in formal education (Kaya & Seleti, 2013; Mji et al., 2020; Ned, 2019). There is international criticism in academic circles that local African knowledge practices are missing from curricula (Ezeanya-Esiobu et al., 2021; Kaya, 2013). It is argued that indigenous knowledge is generally underrepresented in curricula (van Wyk & Higgs, 2011). In fact this underrepresentation is based on the general notion that all knowledge that is not of the Euro-Western model, is subaltern (Mudaly & Ismail, 2013). The underrepresentation of IK in most African university science programmes results in science education programmes being irrelevant to local communities (Hauser et al., 2009; Mudaly, 2018). African countries therefore, are faced with a huge task that requires them to realign, rethink, reconceptualise and reshape their university curricula by breaking away from the prevailing Euro-Western model that has silenced, devalued, and alienated IK education, in a quest for relevant, meaningful education. Such a reorientation would contribute significantly to the preservation of cultural heritage (Arenas et al., 2012). Education is an important avenue that Africans can navigate to restore, strengthen, and recognise their traditional knowledge (Handayani et al., 2018; Jacob et al.,

2018; Khupe, 2014). Therefore, through revised curricula, the scourge of epistemicides (Janson, 2019; Paraskeva, 2016) can be interrupted.

A curriculum that includes useful IK is critical in the modern world, as it becomes increasingly important for indigenous peoples to share and develop their own knowledge and heritage (Hauser et al., 2009) and hence their sense of self. This process includes incorporating indigenous voices by accepting indigenous input into research and curricula development (Ahuriri-Driscoll et al., 2021). Furthermore, knowledge production and dissemination should not be the monopoly of any one dominant culture (Moyo & Gonye, 2021). Instead, knowledge systems should complement one another (Le Grange, 2016; Masaka, 2018).

In 2015, the call for decolonisation of curricula dominated private and public discourses in South Africa (Matiwana, 2019). Therefore, African universities cannot ignore this wave as this may have far reaching impacts within the African education system, in the wake of promoting an education system that is representative of different worldviews. South African student demonstrations have provided much-needed impetus for African universities to rethink their curricula so that it become inclusive.

One way is to decentre Euro-Western knowledge, and privilege other epistemologies using a decolonial lens (van Rooyen, 2016), and this is what my study aimed to realise. This study examined the IK of infectious diseases among the Karanga healers (KHs), as well as four modules studied by pre-service teachers. Based on this, the potential for integrating IK of infectious disease management into the current Biology teacher education curriculum was explored. A detailed description of data from the interviews, document analysis, and focus group discussions, formed the basis for the findings of this study.

In this chapter the purpose of the study, the research questions and objectives, the rationale for the study and its significance, a synopsis of the research methodology, and an overview of the structure of the study report, are outlined.

## **1.2 Rationale for the Study**

The rationale for this study is presented in three parts. First, I locate it in the realm of my life experience, which includes my awareness of the reliance on traditional (indigenous) methods to diagnose and treat infections. Based on my life experience, I am convinced that KHS provide a relevant explanation of what the occurrence of infectious diseases means in their context, and how they have dealt and continue to deal with infectious diseases. I am aware of the use of ethno medicinal plants and indigenous remedies and believe that this knowledge can be used to enhance the current curriculum for Biology pre-service teachers.

Second, the literature calling to address the peripheralisation of IK in formal teacher education, motivated me to conduct this study. For instance, studies by Mgqwashu (2016) described how colonisation has robbed Africa of its ideas, creativity, originality, talents, and knowledge necessary for economic, political, and social development. Odora-Hoppers (2019) argued that the African education system should not have been abandoned in the first place, but should have been integrated into the education system at the time of colonisation. As a practicing teacher educator, it is my hope to achieve the restoration of some of the indigenous knowledge base that I believe could have led Africa to greater prosperity, in all its areas of development.

The third reason is based on my experience as a teacher educator. Reflection on my professional practice reveals that I am complicit in perpetuating coloniality through the curriculum. The current study advocates for breaking this 'normalcy' by including Karanga

healers' (KHs) knowledge of infectious diseases, in the Biology teacher education curriculum. This would be one way to promote the value of a diversity of knowledge.

### **1.3 Problem Statement**

There are many challenges related to incorporating or integrating IK into the existing curriculum. These include primary colonisation of the curriculum, which occurs through the devaluation and exclusion of African indigenous knowledge systems (AIKS), and secondary colonisation, in which the colonised accepted as normal a curriculum that values only Euro-Western worldviews as the single legitimate knowledge system (Istratii, 2020; Istratii, et al., 2018; Mbembe, 2016). Moreover, Istratii (2020) highlighted that the persistent domination of the Euro-Western epistemologies is not only due to the mere representation of content of Euro-Western origins, but have penetrated the field of research. In this case Istratii (2020) argued that it is material possession that has an influence on the nature and outcome of most research based on specific research development and publication.

Many practising educators tend to resist changing established norms (Moncrieffe et al., 2019, Moncrieffe, 2020), and are therefore complicit in coloniality, albeit unknowingly. Coloniality occurs when features of colonialism dominate state institutions and the everyday lives of indigenous people (Maldonado-Torres, 2007). Coloniality is sustained by scholarly challenges, such as the lack of personnel with adequate IK, the lack of institutional commitment, and especially the lack of reference materials (Kaya, 2013; Risiro, 2019).

From another perspective, Swartz (2018) asserts that knowledge that is excluded from the curriculum has the same potential as knowledge that is included. That is, knowledge relegated to the periphery of the curriculum can be as useful as knowledge that is at the centre of the curriculum. The argument thus proffered here, lies in identifying knowledge as a key component of development, of which knowledge is not only a view of the Euro-Western dimension. Hence the need to have a curriculum informed from different philosophical

perspectives, indigenous knowledge of the African people being included too. In this study knowledge (from AIKS) will be included in the Biology teacher education curriculum. The usefulness of IK, especially traditional medicine, has been increasing since the COVID-19 outbreak (Silveira et al., 2020). This is a clear confirmation that IK has the potential to make an important contribution to the treatment of infections.

#### **1.4 Purpose and focus of this study**

The purpose of this study was to examine indigenous knowledge about infectious diseases in the Biology teacher education curriculum. In this study, possibilities of incorporating the Karanga healers' indigenous knowledge (viz. knowledge, attitudes, and practices) related to infectious diseases into the existing university curriculum, were explored.

The main goal was to develop approaches to integrate IK into part of a teacher education curriculum, to address the marginalisation of IK in formal Biology teacher education.

#### **1.5 Research objectives**

The study was informed by the following objectives:

1. To explore indigenous knowledge used in the treatment of infectious diseases, by Karanga healers.
2. To explore how indigenous knowledge of infectious diseases is being presented in the Biology teacher education curriculum.
3. To investigate how indigenous knowledge of infectious diseases can be incorporated into the Biology teacher education curriculum.

#### **1.6 Research Questions (RQ)**

The study was guided by the following research questions:

1. What is the Karanga indigenous knowledge associated with infectious diseases?

2. To what extent is indigenous knowledge of infectious diseases presented in the Biology teacher education curriculum? Why is this the case?
3. How can indigenous knowledge of infectious diseases, be incorporated into the Biology teacher education curriculum?

### **1.7 Significance of the study**

This study is important for higher education decision makers to critically reflect on the ideological sub-texts of policies. The study will inform what AIK content and what AIK pedagogy could be included in the curriculum for Biology teacher education. This will provide the potential to create a multicultural curriculum that is reflective of different world views, where the once muted have a say alongside the once dominant, thus promoting the ideology of epistemological pluralism. The study is also significant to pre-service teachers who will recognise AIK as valuable, especially in light of global challenges. Ontologically, this means a rebirthing of the once vibrant AIKS. In this way teachers are given the privilege of teaching AIKS in their classes, learners are accorded the right to learn information about their cultural heritage, lived experiences (a primogeniture with their communities sources of knowledge) and the current curriculum with Euro-Western origins. The study is significant to IK holders who can take the opportunity to contribute to curriculum development and make the curriculum relevant and community-oriented. The communities through the participation of selected healers, can become centres of knowledge production as well as research, and they could identify themselves as important stakeholders in curriculum matters. In addition, the study is significant in disrupting the top-down approach to curriculum development and advancing the bottom-up approach. In this way students and the community, through selected indigenous knowledge holders could influence content development and dissemination at university level. Theoretically, the bottom-up approach is a democratic approach to decolonising the curriculum through complicated curriculum conversations

(Pinar, 2011, Le Grange, 2016) where the once colonised are respected, and given their space in moulding an all-inclusive curriculum. Thus a curriculum that undoes the divide between the Euro-Western and African indigenous world views, is envisaged. This divide which Santos (2014) identified as an abyssal line has and still continues to demonise IKS and its producers, and hence needs to be subverted, to achieve some form of epistemological pluralism (Istratii, 2020). In this way, the colonised are emancipated intellectually to some degree by being able to recover the forgotten IK and locate it in the curriculum as legitimate, valuable and significant.

### **1.8 Synopsis of the research methodology**

The current study is located with the critical paradigm. The study used qualitative methodologies in which participatory approaches were applied. Data was generated through semi-structured interviews with purposively sampled Karanga healers, focus group interviews with pre-service teachers, and document analysis of four modules for pre-service teachers. Multiple data generation methods contributed to the rigor of this study. Thematic analysis was used to generate themes that addressed the research questions. Ethical issues were observed before, during and after data generation.

### **1.9 Overview of the thesis**

The study is presented in eight chapters. Chapter one forms the backbone of the study. It contains the background and introduction to the study, the purpose and focus of the study, the research questions and objectives, the rationale for the study, the significance of the study, and an overview of the entire thesis.

Chapter two presents the theoretical framework that underlies this study. This framework consists of the decolonial, social transformation, and social reconstruction theories. Each of these theories is briefly discussed and related to this study.

Chapter three provides a detailed review of the literature on decolonising the curriculum through understanding the nature of indigenous knowledge, understanding the prevalence of infectious diseases in Africa, exploring infectious disease management from an indigenous perspective, understanding curricula in general, and understanding decoloniality.

Chapter four outlines the research methods which were adopted. In the first section, details are provided about the context of the study. This is followed by a comprehensive description of the research paradigm and the rationale for its selection. A brief description of the research approach is also provided, and how it relates to the present study. An overview of the research design underlying this study is presented. Further, the chapter describes how the participants were selected, how the data was generated, the research instruments used, the process of data analysis, the criteria for trustworthiness, the related ethical considerations, the use, storage, and disposal of the data, and the limitations of the study.

Chapter five presents the results and findings related to research question 1: *What is the Karanga indigenous knowledge associated with infectious diseases?* This is a reflection on the KHs' worldview of infectious disease management.

Chapter six presents the results and findings related to research questions two and three, in two parts. In the first part, the results and findings of the analysis of four Biology modules for pre-service teachers are presented to answer research question two (*To what extent is indigenous knowledge of infectious diseases presented in the Biology teacher education curriculum? Why is this the case?*). In the second part, the results and findings for research question three (*How can indigenous knowledge of infectious diseases be incorporated into the Biology teacher education curriculum?*), are presented. These are based on data obtained from focus group interviews (FGIs) with pre-service teachers, and analyses of lesson plans created by pre-service teachers.

In chapter seven, theoretical constructs that informed and emerged from this study are discussed.

Finally in chapter eight, a summary of the findings, study implications, recommendations and the critique of the study are outlined.

### **1.10 Working terms**

The current study was broad and guided by number of terms such as indigenous knowledge systems (IKS) , curriculum, infectious diseases and decolonisation.

#### *Indigenous knowledge systems (IKS)*

Hoppers (2001, p.76) offers the following definition of IKS: “IKS is characterized by its embeddedness in the cultural web and history of a people including their civilization, and forms the backbone of the social, economic, scientific and technological identity of such a people.” Hoppers (2002) also questions how knowledge-rich Africans can be economically poor. To this end she decries the culture of extractivism from indigenous settings by capitalist enterprises and makes an appeal for the protection of indigenous resources.

#### *Infectious diseases*

Damodor et al., (2012, p. 1) identify “infectious diseases, as transmissible diseases or communicable diseases comprise clinically evident illness (i.e., characteristic medical signs and/or symptoms of disease) resulting from the infection, presence and growth of pathogenic biological agents in an individual host organism”. Damodor et al., (2012) posit that infectious diseases are caused by pathogenic organisms such as viruses and bacteria which attacks one’s immune system.

### *Curriculum*

In the context of this study curriculum Le Grange (2016:7) defines curriculum as “the explicit curriculum as that with which students are provided such as module frameworks, prescribed readings, assessments guidelines, etc”. In the same vein curriculum has been defined as the sum total of human effort directed toward the realisation of society's goals. It is what happens to the students for which the school is responsible (Hamilton-Ekeke & Dorgu, 2015) .

### *Decolonisation*

Many scholars define decolonisation differently for example Mheta et al., (2018) position it as process removal, separation, dethroning, negation or reversal of colonial establishments in education. Parashar and Schulz (2021) described decolonialisation as transforming the mode of thinking, anticolonial movement, erasure of power imbalances, and as a self-reflective process accepting reality as embedded in one’s true life. More about the concept of decolonisation is covered in chapter two under the theoretical framework

### **1.11 Summary of chapter**

In this chapter, I introduced the focus of the study aimed at identifying content knowledge and practices related to infectious diseases among Karanga healers, and described opportunities for embedding this knowledge in the pre-service teacher education curriculum. The chapter also presented the background of the study, the rationale for conducting the study, the purpose of the study, the research questions and related objectives. A brief overview of the research methodology was also presented. The next chapter discusses the theoretical framework based on decolonial, social transformation, and social reconstruction theories.

**CHAPTER 2****THEORETICAL FRAMEWORK**

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## 2.1 Introduction

In this chapter, details of the theoretical frameworks that guided this study are outlined. The theoretical frameworks for the study were informed by, decolonial, social reconstruction, and social transformation theories. These theories are embedded within the critical paradigm that relates to society, whose purpose is to criticise and justify the existing status quo and to provide alternate knowledge to produce a better social order (Faculty of Economics and Business-Universitas Gadjah Mada [FEB-UGM], 2021). A description of the points of intersection of these theories and how they complemented one another to inform the theoretical orientation of the current study, is presented.

Based on the above theories, the study sought to work toward dismantling the colonial legacy that continues to shape higher education in most African countries, decades after their independence (Ndlovu-Gatsheni, 2020). This required revisiting the epistemological orientation promoted by most African countries that assumed political power, and perpetuated the colonial legacy by not challenging the curricula in schools and universities (Ndlovu-Gatsheni, 2020). This was achieved by tapping into IK related to infections. The underrepresentation of indigenous communities is best expressed in the following quote by Stein and Andreotti:

Today, the numerous calls for decolonisation can be summarised into three main concerns: (1) the continued colonisation of Indigenous peoples in settler colonies, as well as the continuing legacies of Black enslavement and the forcible demarcation of national boundaries; (2) the highly unequal accumulated social, economic, and epistemic effects of centuries of colonialism and slavery on populations around the world; and (3) the persistence of colonial architectures of global governance, such as International Monetary Fund [IMF] and World Bank [WB] lending policies, strict immigration controls in Europe, and the continued assertion of the right of Western nations to police the world (militarily and otherwise), all of which favour the maintenance of Western dominance and expand the reach of global capitalism (2016, p. 46).

The above quote demonstrates the continued domination of the settler regime. Moreover, African policies are viewed as templates of the former colonial masters in a supposedly

different nation (Le Grange, 2016). The epistemic space is dominated by the ideologies of Euro-Western nations (Maistry, 2019). It therefore becomes imperative for indigenous communities to be active in addressing social injustice. Stein and Andreotti (2016) argued that the university should play a social role in promoting and restoring social justice and humanity that have been brutally diminished by colonisation. However, what is ongoing is the incessant promotion of Euro-Western culture that is evident in almost all spheres of African states and their institutions, be it social, economic, political or architectural. In this regard it is argued that the indigenes accepted the atrocities committed against them and learnt to live on as a 'form of progress' (Odora-Hoppers, 2019, p. 19). This is what characterises most education systems in Africa where success and progress are measured against a Euro-Western template. Consequently, they produce cheap labour for the capital markets (Ndlovu-Gatsheni, 2021).

Curriculum reform can be viewed in the context of justice (Santos, 2014). Elsewhere, wa Thiong'o (1992) advocated for cognitive liberation through decolonisation of the mind. Furthermore, Omanga (2020) agreed that colonial powers originally colonised the human mind, to an extent that the minds of the colonised are now trapped and in need of liberation. It follows that the existing systems are a result of the oppression that separated the indigenous people from their way of life. In most African countries, for example, many indigenous people have been brainwashed into disrespecting their ancestors, denying their healing abilities, and labelling healers as 'witches' (Ekore & Lanre-Abass, 2016, p. 12).

## **2.2 Decolonial Theory**

In this study, the concept of decolonisation/decolonial theory was used to clarify how teacher education curricula can be decolonised by incorporating indigenous knowledge practices.

Decolonisation is a broad concept that can be viewed from a different theoretical perspectives. After the colonisers' flags were lowered, the myth of a postcolonial era dawned

(Le Grange, 2021). This is a myth because it expands and is dominated by the legacy of colonisation, and this is referred to as coloniality (Le Grange, 2021). Intersecting influences of coloniality of power, coloniality of knowledge and coloniality of being, pave the way to an age of modernity that privileges only the Global North and further impoverishes and disempowers the rest (Ndlovu-Gatsheni, 2020).

The idea of the global north and south, sometimes known as the north-south divide in a global context, refers to a collection of nations that have similar socioeconomic and political traits (Kowalski, 2020). The phrase "Global South" is frequently used to refer to parts of Latin America, Asia, Africa, and Oceania. These are developing nations, primarily located in the southern hemisphere, with poor incomes and a variety of structural issues (Kowalski, 2020). The phrase "Global North," on the other hand, refers to developed nations primarily located in the northern hemisphere, which are characterised by high income levels, technological advances, a well-built infrastructure, and macroeconomic and political stability (Kowalski, 2020). Global South and Global North are separated by the Brandt line. The Brandt line is "an imaginary line encircling the world at a latitude of approximately 30 degrees North, drawn up by Willy Brandt in 1980s to show the persistent socio-economic differences between developed countries above the line (the Global North) and developing countries below the line (the Global South) (Kowalski, 2020, p.2).

For the purposes of this study, key features from the deconstruction and decentering of colonial curricula, are drawn upon (Le Grange, 2016; 2018). The study was also informed by the stages of rediscovery and recovery, mourning, dreaming, engagement, and action in decolonising curricula (Chilisa, 2012). Similarly, the study relied on the principles of relational accountability, respectful representation, reciprocal appropriation, and rights and regulation (Le Grange, 2006), social reconstruction (Esmaeili et al., 2015), and appropriate

indigenous curriculum (Hauser et al., 2009). These principles were selected because they resonate with the research questions, purpose, and methodology of this study.

The main focus on decolonisation arises from the perception that the curriculum is foreign to the communities served by universities (Ng'asike, 2019). This is tantamount to epistemicides (Santos, 2014) and the theft of a group's history, the killing of other people's knowledge, the killing of other people's languages and the imposition of colonial languages, the killing of other people's cultures and the initiation of cultural and social imperialism (Ndlovu-Gatsheni, 2021). Put simply, the education system that prevailed during the colonial era and still characterises education systems in Africa, is one that does not take indigenous knowledge into account and does not recognise the voice of the poor in curriculum matters (Fataar, 2018). Accordingly, higher education institutions are seen as centres that promote Euro-Western ideals and exclude the knowledge of the colonised (Le Grange, 2016). Furthermore, Mahabeer (2018) asserted that the exclusion of IK in formal education is due to the formulation of policies that tend to promote Euro-Western ideologies. From this input it is clear that colonialism continues to shape education policy in Africa.

In the context of this study curriculum Le Grange (2016:7) defines curriculum as “the explicit curriculum as that with which students are provided such as module frameworks, prescribed readings, assessments guidelines, etc”.

Many scholars define decolonisation differently example Mheta et al (2018) position it as process removal, separation, dethroning, negation or reversal of colonial establishments in education. More about the concept of decolonisation is covered in chapter two under the theore

Matiwana (2019) argued that colonisation has robbed Africans of their history and prevented people from leading decent and dignified lives. In other words, colonisation contributed to

eroding the self-esteem and self-concept of the colonised (Garcia-Olp, 2018). The decolonisation process should be viewed from the perspective of redesigning, revising, and reconfiguring the curriculum to serve the interests of its immediate target audience (local communities). This means developing a curriculum that is responsive to culture and informed by an African philosophy (Waghid, 2020).

However, Le Grange (2016) acknowledged that decolonisation is a complex process that requires careful planning and implementation. Le Grange (2018) asserted that the decolonial movement aims to undo colonialism by deconstructing and decentering colonial knowledge. In the same vein, Fataar (2018) called for an Africa-centred epistemology in curriculum matters. This, according to Fataar (2018), is the best approach to place Africa at the centre of knowledge production and dissemination. Mudaly (2018) asserted that rediscovery and reclamation are critical to creating an inclusive and equitable curriculum.

The ideology of re-centring is the best approach to decolonising the curriculum (Kiti, 2013). This can be achieved through the inclusion of African Indigenous Knowledge Systems (AIKS) in education. Therefore, indigenisation is linked to decolonisation. Indigenisation involves a process of discovery and rediscovery of knowledge, as the first step in decolonising a curriculum (Le Grange, 2018). Indigenisation is not synonymous to decolonisation, but is a strategy towards decolonisation that is privileged in this study. There are other strategies for decolonising a curriculum that are not the focus of this study, hence these are not discussed.

Koopman (2018) advocated for a multicultural approach to curriculum issues where equivalencies and connections are made among different knowledge systems to promote learner understanding and critical skills development. Relational accountability, reciprocal appropriation, rights and regulations, and respectful representation are key concepts in

decolonising the curriculum, proposed by Le Grange (2016). Relational accountability refers to an inclusive and connected curriculum. Therefore, a teacher education curriculum that produces teachers who are conversant with different types of knowledges, is useful.

Consequently, it is important that teachers be immersed in and identify with the norms, beliefs, values, and cultures of the community in which they work. Respectful representation in this study refers to the recognition of IK as an essential element in decolonising the curriculum. It also involves listening to and valuing voices of KHs (IK holders). Reciprocal appropriation refers to the informed acceptance of different forms of knowledge and the creation of a democratic space for coexistence, to create a more equitable curriculum. Rights and regulations mean that indigenous peoples are recognised as owners of the knowledge used in the curriculum. In the words of Waghid (2014), there should be a connection between the two knowledge systems to create new knowledge spaces in this way.

Connell (2016) argued that knowledge was collected from the colonised world and assembled in imperial centres. The imperial centres then became centres of theorising and intellectual rights, marginalising the colonised societies and individuals who participated in the era of knowledge production (Connell, 2016; Kiti, 2013). This was referred to by Ndlovu-Gatsheni (2021) as the theft of knowledge. Kiti (2013) argued that research in universities is determined by Euro-Western ideologies. Africa is known as the ground that provides resources and information for theorising in the North (Kiti, 2013). This reflects a blatant and oppressive marginalisation of key knowledge systems, hence the call for the restoration and redress of existing imbalances in the academic space. The issue of decolonisation has been and continues to be a contentious issue where an impetus is needed to focus on the malleability of the curriculum and to what IK can be included into the Biology curriculum for pre-service teachers.

Le Grange (2016, p. 9) suggested "radical rethinking, new trans-disciplinary knowledge, the development and design of a local and regional curriculum rooted in the African context, and a three-way cycle" as ways to decolonise the curriculum. In a sense, a radical rethinking of Euro-Western disciplines is characterised by the need to hear the voice of the colonised regarding curriculum issues. Mbembe (2016) contended that decolonisation is not about design, complete about tinkering around the edges. Rather, it is about redesign, about making people craftsmen and craftswomen again, who do not have to follow pre-existing models and use them as paradigms for redesigning things and creating new forms. This is consistent with views espoused by Manathunga (2018) that the first step to decolonising the curriculum is for the dominant class to listen to the concerns of the oppressed in order to redress the imbalances.

Handayani et al. (2018) called for the inclusion of what they termed the inaudible voice in teacher education. Koopman (2018) advocated for the inclusion of the suppressed voice, pointing to the need to respect and listen to community sages who have knowledge, in order to create the space for intellectual matrices.

The study also used the emerging trans-disciplinary knowledge dimension, which envisions an integrative knowledge system that emerges from the active participation of various stakeholders. This means developing and designing a glocal (locally and globally) curriculum in which the knowledge of different cultures and voices are equally represented. In this study, it means decentering, but not excluding, the Euro-Western knowledge system. The study aimed to improve the respectful representation and ultimately the coexistence of IK and Euro-Western knowledge systems, in the Biology curriculum for teacher education. This is consistent with Le Grange's (2016, p.9) argument that the curriculum should be "rooted in the African context, where students learn together about the origins of humanity and the epistemologies that emerged at the cradle of humanity". Ultimately, this implies that students

would value their differences and develop a need to respect and accept one another in their learning. Le Grange (2016, p. 10) proposed a cycle of three pathways that include "the cycle in ancestral science education (doing together and learning to learn), the cycle in Western science (unlearning and then re-learning), and the cycle of inter-culturality (unlearning and relearning and moving from learning to undertaking)". Although this is complex and controversial, it would lead to a deconstruction of knowledge and allow for knowledge to be mediated in and with local epistemic orientations (Koopman, 2018). This may involve the domestication of Euro-Western knowledge in a way that makes it relevant.

Chilisa (2012) has described five phases related to decolonising the curriculum. Rediscovery and restoration deals with the redefinition of history, culture, language, and identity by the colonised. Rediscovery and recovery is based on reclaiming the marginalised cultural heritage and identities of indigenous peoples, with the eventual goal of integrating them into the curriculum. Mourning refers to the persistence of colonial culture that has defined (and continues to define) university curricula, and the enormity of the consequences of excluding IK, in colonised communities. This re-imagining- a vision by the colonised to incorporate their knowledge practices into the university curriculum. Commitment is a stirring conversation that engages all stakeholders to acknowledge the existence of marginalised knowledge systems, that have the potential to solve contemporary problems. Acting means finding appropriate ways to incorporate IK into (teacher) education. In this study, acting included the work of pre-service teachers, KHS, and myself in establishing the critiquing the university curriculum and unearthing its sub-text. In the context of this study, I worked with pre-service teachers to seek opportunities for coexistence of different knowledge systems, excluding Euro-Western practices, but decentering the layer, as an approach to decolonisation.

Jansen (2017) argued that decolonisation may not be effectively implemented in curriculum reforms because what counts as knowledge has been narrowed to the extent that the current paradigm has been normalised and accepted even by the oppressed classes, including academics. I looked for practical rather than theoretical curricular approaches, within a teacher education curriculum at a university in Zimbabwe. This was motivated by Moosa (2018) who argued that any decolonial movement must focus on change at the institutional and curriculum levels. A decolonial practical approach would therefore initiate a long overdue process that has been driven by the intellectual laziness of political liberation advocates (Christie, 2020; Ndlovu-Gatsheni, 2021). This issue addresses the hotly contested questions of what is being done by higher education institutions to foster a decolonial motive. Teffo (2019) reminded the academic world that we are now in a poly-epistemic ecosystem whose knowledge systems are only complete when they complement one another.

### **2.3 Social reconstruction**

Decolonising the curriculum can also be addressed through the social reconstruction approach. The social reconstruction approach to decolonisation is based on the initiatives of deconstruction and reconstruction (Zezeza, 2009). The main theses of reconstruction are:

1. The society in which we live is in an unhealthy state and this state has been accepted. People are struggling with the anomalies, many of which are oppressive.
2. Every society has the potential to redeem itself from destruction by having a better vision of its life.
3. People must be active to force reconstruction for their betterment and emancipation.
4. Education is the greatest tool that has been used to destroy the colonised and should be used by the colonised as a tool for reconstruction (Zezeza, 2009).

Social reconstructionists view education systems in Africa as predominantly Euro-Western. They argue that the curricula still reflect colonial values, knowledge systems, and culture. The main contestation is that the curriculum should be redesigned to reflect the principles of equality, freedom, and social justice (Aboluwodi, 2011). The argument in favour of curriculum reconstitution led to scholars such as Christie (2020), contending that the inequalities in education created by colonialism, be eliminated.

In this context, Esmaeili et al. (2015) identified 21 roles of the university in the social reconstruction of the education sector. For the purposes of this study, only four will be discussed and adopted in the research.

These are:

1. Inequalities in education caused by colonialism and how they should be addressed. In this study, pre-service teachers were provided spaces to critically analyse the curriculum with a view to incorporating IK into their lesson plans (restoring past values by tapping into the knowledge repository of indigenous KHS).
2. Refining and restoring past values and enhancing them in society. This is an important part of this study as I researched IK of infectious diseases and worked collaboratively with pre-service teachers to incorporate those findings into the Biology teacher education modules. This resonates with recovery and rediscovery.
3. Restructuring of patterns and texts. For the purposes of this study, decentering Euro-Western knowledge practices and re-centering AHS were used as guiding principles.
4. Reconstruction of cultural coexistence between Euro-Western knowledge system and indigenous African knowledge system. Rosenberg (cited in Koopman 2018) supported this

idea by arguing for an educational system that is not separate from society. This in a way, respects cultural diversity through promotion of diversity of knowledges.

Marope (2015) argued for what he called a redesign of the curriculum. This includes incorporating new but indigenous elements into the curriculum to promote relevance (wa Thiong'o, 1992). This study focused on identifying indigenous content knowledge and practices that can be included in the curriculum. Marope (2015) also suggested that re-conceptualisation should be viewed as a complex process that requires the identification of the elements that make up the course of study. This leads to the identification of gaps, and opportunities that open up, creating space for curriculum reconstruction and desired changes (Luckett, 2016). In the current study, an analysis of the Biology curriculum for educators was conducted to determine what knowledge system is being promoted, that is, to raise collective consciousness about the ideological sub-text of the university curriculum, and how best to promote the plurality of knowledges in that curriculum.

#### **2.4 Social transformation theory**

The heart of this theory, in this context, is the decolonisation of higher education. The main pillars of this theory are: resistance to change, advocates of change, alternative vision, and nation building. According to Fomunyam (2017), resistance to change is the only force that brings about change itself. Resistance to change is attributed to many factors. One of them is that people or institutions are satisfied with what they have. Fomunyam (2017) highlighted that resistance to change can be institutional if little or no effort is made to change the curriculum from a decolonial perspective.

‘Advocates for change’ is another pillar that supports the social transformation theory.

Fomunyam (2017) argued that society inherently craves change. This is what Chilisa (2012) referred to as dreaming. The current state of the university curriculum needs attention.

Indeed, Watony (cited in Fomunyam, 2017) suggested that education should be used as a tool to bring about change because it was and is used to support/promote colonial interests in Africa. Therefore, rebuilding the social fabric after years of dehumanisation can be effected by transforming educational institutions. Ndlovu-Gatsheni (2021) argued that complete decolonisation can be achieved through the reintroduction of an indigenous based curriculum. He argued that the current situation is an expression of epistemological inertia in which African institutions and systems cannot think beyond their epistemological heritage that identifies African educational systems with Euro-Western ideologies. Hence, this implies a lack of epistemological confidence among African institutions (Gwaravanda, 2019). Ndlovu-Gatsheni (2021, p.1) states that "change in education is urgently needed; reform alone is not enough. What we really need is epistemological change." He also supports the 5.0 Education initiative in Zimbabwe, which is a heritage-based philosophy (Ministry of Higher and Tertiary Education, Science and Technology Development [MHTESTD], 2018).

Within the social transformation approach, an alternative vision is advocated for. Fomunyam (2017) argued that the community is not capable of bringing about change; therefore, action must be taken by tapping into the multi-layered silent voices. This is also reflected by Chilisa's (2012) action approach to decolonising the curriculum. Resistance to change is inevitable, but the voice of the colonised must be heard and respected in curriculum matters, in keeping with what Le Grange (2016) referred to as respectful representation. This implies inclusive engagement (Mudaly, 2018) and viewing curricula as a complicated conversation (Le Grange, 2016). In terms of teacher education, Mayne (2014) argued that teachers should be prepared to be critical thinkers who promote equity, quality, and access to education. Teachers are seen as agents of transformation through the implementation of a multiverse curriculum. However, Odora-Hoppers (2019) sympathised with teachers in this regard. She argued that teachers are caught between two positions in this transformation process. On the

one hand, they are those who benefit from the oppressive system; on the other hand, they are expected to interact with poor Africans whose knowledge has been and continues to be, ridiculed by prevailing Euro-Western ideologies (Odora-Hoppers, 2019). Therefore, it is imperative for teacher education to empower the teacher en route to pedagogical becoming (Le Grange, 2016).

Nation building is the final pillar of the social transformative theory. Fomunyam (2017) described this as being based on the principles of reconstruction, rebuilding, and realignment. The need to rebuild, reconstruct, and realign implies that something is amiss. In terms of curricula, the subjugation of indigenous knowledge by the Euro-Western knowledge perspective needs to be corrected (Odora-Hoppers, 2019). This should be done to promote a critical construction of knowledge from a situated position. Indeed, education in Africa has lost its cultural reference (Ngubane & Makua, 2019). Consequently, Odora-Hoppers (2001) questions the logic behind nation building through lifelong learning and empowerment, because development is viewed only from a Euro-Western cultural perspective. Teffo (2019) noted that the denial and continued marginalisation of indigenous knowledge is perpetuated by the most educated people and by the very institutions that should be working to protect it. Therefore, this study focuses on creating opportunities to include the marginalised and isolated IK, in teacher education.

## **2.5 Interfacing decoloniality, social reconstruction and transformative theories**

Decolonising the curriculum requires practical rather than theoretical approaches, to be successful. In other words, there should be less emphasis on what decoloniality is as a concept and greater emphasis on what decoloniality can do (Le Grange, 2021).

Le Grange (2018, p. 43) cites Pinar (2011) who viewed curriculum as a complicated conversation that aims to create something new and change the perceptions of those involved.

Complicated conversations are described as:

Conversations in which the interlocutors speak not only to each other but also to those who are not present, not only to historical figures and unnamed peoples and places they may study, but also to politicians and parents who are dead or alive, not to mention the selves they were, are becoming, and may one day become.

By this definition, a complicated conversation is a comprehensive process that not only deals with the present and the living, but also involves the dead, the past, and the cosmos, and is therefore inherently complex. Maguire and Young (2015, p.15) added that solidarity in higher education can be achieved through "consultations with traditional knowledge holders and students about the implications of culturally confronting curricula and training of staff to ensure that academic content is appropriately inclusive." Maguire and Young (2015) supported the idea of complicated curriculum conversations and suggested that an indigenisation perspective must utilise local health professionals (KHs) in disadvantaged communities to obtain information and necessary resources for inclusion in curricula. Oakeshott (cited in Le Grange, 2018) posited that a conversation is only viable when diverse views and voices are heard. Mudaly (2018, p.50) asserted that the "... IKS-education interface has the potential to give visibility, voice, and agency to culturally marginalised people." My study privileged diverse voices from a variety of stakeholders, pre-service teachers and KHs as health professionals. In this context, I define a professional not as a person who is certified based on Western barometers of competence, but as a holder of knowledge upon whose cultural wisdom a particular community depends. This wisdom may take the form of healing using plants, rainmaking, or food security measures, among many other practices that ensure community survival.

Pinar (2004) called for creating a democratic space for all stakeholders in a curriculum conversation. Accordingly, complicated curriculum conversations involve unconditional respect for diverse participants with different cultural backgrounds. Respect means minimising social power among participants (Le Grange, 2018). All participants must temporarily shed their roles (abandon their professional roles) and operate on the same level, when in a complicated curriculum conversation. Le Grange (2018, p.4) identified "*potestas* and *potentia*" as the two centers of social power. *Potestas* is a negative power associated with destruction, while *potentia* is a positive power and is significant in adding value to curriculum conversations. Le Grange argued that *potestas*, because of its destructive nature, must be tamed by applying principles of self-criticism and respect for others. *Potentia* leads to openness and free exchange of ideas during a conversation (Le Grange, 2018). Through *potentia*, there is a high likelihood of decentering the curriculum, promoting the equality of knowledge systems, and supporting the coexistence of different knowledge systems in the curriculum. In this study, *potentia* showed participants that they could contribute their knowledge to curriculum development. This was achieved by collecting data from KHs, who valued the incorporation of IK into mainstream curricula.

Hauser et al., (2009) advocated for a science curriculum based on contemporary, interconnected events. Hauser et al., (2009, p. 51) suggested critical measures to consider an appropriate and indigenous curriculum, such as "the inclusion of ontological pluralism, the implementation of a community-oriented curriculum, and institutions that engage in a processes of reflexivity". This was echoed by Teffo (2019), who argued for epistemic pluralism. Ontological pluralism involves the coexistence of different knowledge systems (Connell, 2016; Odora-Hoppers, 2019). This means that it is necessary to acknowledge the existence of multiple forms of knowledge from various knowledge systems. This requires practical actions such as using the services of indigenous sages from the community as

sources of information, that can be sensitively integrated into a course or topic. The design of a community-based curriculum is based on the inclusion of indigenous peoples and their ontologies in terms of ontological pluralism. This is consistent with place-based education, where indigenous peoples should define their knowledge, practices, and skills from within their communities. In a sense, this empowers indigenous communities and maintains their cultural heritage. Institutions undertaking reflective processes - this directs leaders in educational institutions to adopt practical approaches that aim for epistemic pluralism.

A decentering approach was used in my study to address the epistemic inequities that characterise the Biology teacher education curriculum. The measures outlined by Hauser et al., (2009) of an appropriate indigenous curriculum form the central constructs of this study. The approach by Hauser et al., (2009) was selected for two reasons. This furthers the ideology of a connected curriculum which is linked to relational accountability. Many theoretical constructs are related, amongst the three theories. Le Grange's (2016), emergent interdisciplinary knowledge, mutual appropriation, and relational accountability are contained within the pursuit of epistemic pluralism. This is also true of Chilisa's (2012) notion of rediscovering and reclaiming identities with the goal of achieving ontological pluralism. Furthermore, Le Grange's (2016) postulation of a radical rethinking of Euro-Western disciplines through the implementation of a community-based curriculum, promotes an ontological shift that encourages decentering ubiquitous paradigms. Chilisa's (2012) approaches of mourning and dreaming resonate with reflexivity of higher education institutions and curriculum decisions. Implementing a community-engaged curriculum incorporates both Le Grange's (2016) notion of a complicated curriculum conversation that allows indigenous people to define their knowledge, and Chilisa's (2012) approach of rediscovery and restoration to decolonise the curriculum.

The measures by Hauser et al. (2009) of appropriate indigenous curriculum correlated with the study methodology and based primarily on identifying IK practices through interaction with indigenous voices. Subsequently, this knowledge was shared with pre-service teachers through a series of online activities to identify important themes/ideas that could be incorporated into teacher education. The identified topics were included in the Biology curriculum for pre-service teachers, to promote ontological pluralism. Opportunities to include IK in teacher education were discussed by examining the knowledge of KHS.

## **2.6 Summary of chapter**

The chapter dealt with the background of the decolonisation framework as expounded by various theorists. The theoretical framework rooted in decolonial theory, social reconstruction, and social transformation, and how these theories informed the study, was also examined. What emerged from the chapter is that knowledge production towards ontological and epistemological pluralism, is not a prerogative of any single grouping, but rather a diverse, deliberative project that welcomes the existence of a poly-epistemic society.

**CHAPTER 3****REVIEW OF RELATED LITERATURE**

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### **3.1 Introduction**

In this chapter, literature based on decolonisation of the curriculum and indigenous knowledge is reviewed. The chapter begins with an introduction to indigenous knowledge (IK), the spread of infectious diseases in Africa, then focuses on indigenous knowledge of infectious diseases in Africa. This provides a context for discussing curricula, followed by a comparison between Euro-Western and African views of knowledge. Finally, decolonisation of the curriculum in Africa, and Zimbabwe in particular, is alluded to.

### **3.2 Indigenous knowledge**

Indigenous knowledge can be defined “as a network of knowledges, beliefs, and traditions intended to preserve, communicate, and contextualise indigenous relationships with culture and landscape over time. One might distinguish ‘knowledge’ as factual data, ‘belief’ as religious concepts, and ‘tradition’ as practice, but these terms are often used imprecisely and interchangeably to describe indigenous epistemologies” (Bruchac, 2014, p. 3). This notion of IK has been further explored and associated with hunting, fishing, medicine, construction, agriculture, and socioeconomic activities (Kaya, 2013; Mpofu, 2016). In other words, IK can be linked to the past, defines the present, and retrospectively directs the future within the social, political, and economic milieu (Sillitoe & Marzano, 2009). Indigenous knowledge is viewed from a historical perspective so that a community's lived experiences enrich the knowledge base. Furthermore, indigenous knowledge is understood as knowledge embedded in both social and scientific perspectives (Zidny et al., 2021). This makes indigenous knowledge part of a social science philosophy. It is a knowledge that reflects the life of a particular people in a community. From an African perspective, this knowledge is connected to the cosmos and the interactions between people, hence the physical and spiritual milieus determine the discourses of a particular community (Mosweunyane, 2013). Indigenous knowledge is becoming more widely known as colonised peoples use the spaces that

globalisation creates to forge alliances in opposition to its homogenising and normalising impacts and to decentre western epistemologies (Le Grange ,2022). This study leaned on Zidny et al.'s (2021) conceptualisation of indigenous knowledge as being both social and scientific.

I describe how infectious diseases are seen from an African perspective in the section that follows.

### **3.3 Infectious Diseases in Africa**

Africa is considered a hub for many infectious diseases (Mendelson, 2014). These diseases are costly in Africa as they lead to starvation, and death and affect social, economic, and development needs (Brownlie, 2012). Some of the most common infectious diseases affecting Africans include HIV/AIDS, malaria, tuberculosis, bilharzia, bacillary dysentery, leprosy, guinea worm, river blindness, polio, measles, cholera, monkeypox, Rift valley fever, yellow fever, *Rickettsia felis*, Zika virus, *Chikungunya* virus, Ebola, acute respiratory infections, *Yersia pestis* (Fenollar & Mediannikov, 2018), and the novel coronavirus.

Dzingirai et al. (2017) identified climatic, political, social, and economic factors as major drivers of infectious diseases in Africa. Climatic conditions favour the establishment of vectors such as mosquitoes, tsetse flies, black flies, bats, and many others (Brownlie, 2012). Most infectious diseases are under control, but there is a trend of resurgence and an emergence of new infectious diseases, and Africa is considered unprepared to deal with such emerging infectious diseases (Jalloh et al., 2017). Therefore, Africa should develop indigenous approaches to early detection, prevention, and cure of epidemics, tapping into the underutilised pool of available IK.

While several studies have been conducted in Africa and sub-Saharan Africa on the spread of infectious diseases, this study is one of the few projects that examines indigenous knowledge of infectious diseases and links it to teacher education.

### **3.4 Indigenous knowledge of infectious diseases**

While the Euro-Western view of disease management is based on scientifically proven approaches, indigenous peoples around the world rely on knowledge that was acquired, tested, and proven over generations, before these communities encountered colonisers (Mpofu, 2016). Božek et al. (2020) and Rankoana et al. (2015) asserted that diseases are a result of evil spirits, witchcraft, and sorcery. It is believed that the spiritual world protects and informs about the possibility of an outbreak, preventive approaches, as well as healing (Maunganidze, 2016; Oyieke & Galang, 2016; White, 2015). White (2015) highlighted that from an AIKS perspective, illness is a punishment from ancestors for wrongs committed by the living. Ozioma and Chinwe (2019) identified divination, spiritualism, and herbalism as key to managing illness in African communities. Divination is a process of trying to understand the future with the help of supernatural powers. Spiritualism is a cultural belief that the dead have power over the living and that the living are connected to them, through spirit mediums. Herbalism is the study and use of plants to treat disease. Herbalism is gaining prominence in primary health care worldwide, and it is claimed that 80% of the world's population uses traditional medicine (Debprasad, 2018). For example, Adnan et al., (2019) studied plants used to treat pneumonia and tuberculosis in the Himalayas and found that a number of plants are used by many people to treat tuberculosis and other diseases. In other studies, Mbhenyane (2017) provided evidence of the benefits of indigenous plants that have been and continue to be used, to provide food and medicine for local communities in South Africa. Maroyi (2011), in his studies in the southern part of Zimbabwe, identified a number of plants used to treat various infections. The major breakthrough in highlighting the potential

of medicinal plants can be seen in the work of van Wyk et al. (2009), who compiled a catalogue of ethno medicinal plants in South Africa. In Zimbabwe, Maroyi (2011) and Mpfu (2016) compiled a catalogue of ethno medicinal plants used in the southern and central parts of Zimbabwe, respectively. People unfamiliar with the knowledge and use of plant medicine and the practices of indigenous communities, often lack understanding and question the knowledge contained therein. In fact, Mbhenyane (2017) asserted that all communities use indigenous plants as a source of food and medicine. The lack of scientific evidence for the efficacy of these medicines and the nutritional value of these plants, militates against the use of this knowledge system. However, Mbhenyane (2017) emphasised that there is enough anecdotal evidence confirming the usefulness of indigenous plants. With the outbreak of COVID -19, there was a sustained increase in the number of herbal remedies sold in markets. In Zimbabwe, for example, the sale of *Zumbani* (*Lippia javanica*) became a lucrative business.

Walwyn (2010) noted that traditional medicine and its practitioners play a crucial role in managing the spread of HIV/AIDS. These contributions are vital to the need to merge Euro-Western health approaches with the traditional indigenous health systems, which can lead to a pluralistic health system (Moshabela et al., 2015). This has implications for representing indigenous health practices in higher education (HE).

Msila (2017) argued that representing indigenous health in higher education curricula will help reduce ethnic disparities. Msila (2017) noted that ethno medicine is on the rise again in contemporary society. This was also confirmed by the World Health Organisation [WHO] (2019), who cited ethno medicine's diversity, flexibility, increasing popularity, relatively low cost, low technological complexity, relatively low side effects and growing economic importance, as factors contributing to its increased use. However, ethno medicine is generally treated with disdain by health authorities, primarily because it has not been scientifically

certified in terms of efficiency, efficacy, and safety. Despite this negative attitude to IK-related health practices, the use of IK has been proven to be effective in primary health care (Mpofu, 2016) and should therefore be integrated into mainstream primary health care. However, Ahmad et al. (2021) noted that from a biomedical perspective, health care products from ethno medicinal plants lack scientific evidence about their efficacy. This has been and continues to be the biggest challenge in integrating IK into primary health care. Horill et al. (2018) noted that IK primary health care lacks scientific reduction, verification, control, prediction, and objectivity in practice. However, White (2015) argued that IK is a product of and has been based on the experience and observation of generations. White (2015) further elaborated that this knowledge is embedded in certain beliefs and practices of a people. Ogunniyi and Ogawa (2008) stressed this when they highlighted the link between ethno-medicinal plant remedies and Euro-Western medicine, by providing therapeutic evidence. Therefore, science education should include IK in teacher education so that teachers are able to serve the community from a more informed position. In addition, White (2015) cited some examples in Kenya where two universities have already integrated components of herbal medicine into their pharmacology syllabus. The incorporation of herbal medicine into teaching in Kenya is encouraging, as White (2015) noted. Coupled with the high cost of basic biomedical care, the inclusion of IK in HE is worth striving for. It also opens up space for the bio-medicalisation of most herbal plants.

These contributions are invaluable in merging Euro-Western health approaches with the traditional indigenous health system, which can lead to a pluralistic health system (Moshabela et al., 2015).

### **3.5 The place of IK in the time of COVID-19**

The COVID -19 outbreak triggered mixed feelings about the use IK of traditional medicines to treat infections. There were those who supported the use and potential of traditional medicines, and those who opposed the use of remedies which were not validated by biomedical western standards. The outbreak of COVID-19 triggered momentum towards the use of traditional herbal medicines. In Zimbabwe, for example, trucks were seen transporting harvested *Zumbani* (*Lippia javaniaca*) from the outskirts of the cities to be sold in urban areas. This is illustrated in figure 3.1 below.

**Figure 3.1**

*Truck Carrying Zumbani (Lippia javanica) herb (Source: Researcher)*



This image shows that the outbreak of COVID -19 not only shook the indigenous population, but also challenged them to reconsider their unrecognised (according to western standards) remedies for primary health care. Thus, this image symbolises people's belief in the use and efficacy of herbal remedies. However, from an environmental health perspective, this poses a challenge to the unsustainable use of indigenous plants and may lead to the extinction of valued medicinal plant species. Under these circumstances, knowledge of the healing power of plants must be combined with other concepts such as sustainable harvesting measures, to preserve them. The need to protect our plant heritage from extinction must be embedded in our cultural values. In this regard van Wyk and Prinsloo (2018) pointed out that medicinal plant harvesting is a global concern because plants are the major source of medicines, be it within the Euro-Western biomedical position or the African traditional medical view. Consequently, van Wyk and Prinsloo (2018) called for the need to, preserve and cultivate medicinal plants.

A detailed description of a curriculum is provided in the next section.

### **3.5 Understanding the curriculum**

The conceptualisation of a curriculum can be complex and depends on what one wants to present or clarify at a given time. The first port of call for any educational program is the curriculum (Lebeloane, 2017), therefore it is vital to unpack what a curriculum means from a scholarly position, in order to explore possibilities for decolonising the Biology curriculum for pre-service teachers.

In the following table, I present several definitions of curriculum.

Table 3.1

*Definitions of a curriculum*

Author	Definition
Dewey (1902, p. 11-12)	The curriculum is a continuous reconstruction, passing from the present experience of the child to that represented by the organized bodies of truth which we call studies ... the various studies ... are themselves experience-they are that of the race.
Bobbitt (1918, p.23)	The curriculum is the totality of experiences, both directed and unguided, that contribute to the development of the individual's abilities.
Caswell and Campbell (1935, p. 66-70)	The curriculum is composed of all the experiences children have under the guidance of teachers. . . Curriculum, then, is not a strictly limited content, but rather a process or procedure.
Tyler (1957, p.79)	[The curriculum is] the set of learning experiences planned and directed by the school to achieve its educational goals.
Gagne (1967, p.23)	The curriculum is a sequence of content units arranged in such a way that the learning of each unit can be accomplished as a single act, provided that the skills described in certain preceding units (in the sequence) have already been mastered by the learner.
Popham and Baker (1970, p.48)	[Curriculum is] all planned learning outcomes for which the school is responsible. . . Curriculum refers to the desired consequences of instruction.

McBrien and Brandt (1997)	[Curriculum] refers to a written plan that specifies what is to be taught to students (a course of study). Curriculum may refer to all courses offered at a particular school or to all courses offered at a school in a particular subject area.
Le Grange (2006, p.189)	A curriculum [in higher education] refers to what knowledge is included or excluded in [university] learning/teaching courses.
Indiana Department of Education (2010, n.p)	Curriculum means the planned interaction of students with instructional content, materials, resources, and procedures to assess the achievement of educational objectives.
Hamilton-Ekeke and Dorgu (2015, p.32)	The curriculum is the sum total of human effort directed toward the realisation of society's goals. It is what happens to the students for which the school is responsible.
Lebeloane (2017)	The curriculum is what and to what extent (past, present, and future) teachers want their students to learn the content taught in school.

Different scholars generated many views on the curriculum. For example, Le Grange (2006) referred to explicit (planned), hidden (taught and untaught), and void (excluded) content as the most important components of a curriculum. The curriculum reflects the totality, everything and all experiences that the learner has in a learning environment (Bobbitt, 1918; Dewey, 1902; Hamilton-Ekeke & Dorgu, 2015; Le Grange, 2006; Lebeloane, 2017; McBrien & Brandt, 1997). The definitions also yield important principles for curriculum, which include the goal of study, content, methods, and selection of participants (Lebeloane, 2017; Indiana Department of Education, 2010). These resonate with the views of Su (2012), who considered curriculum as a set of objectives, content, plans, all documents, and experiences to which students are exposed.

In this context, Hamilton-Ekeke and Dorgu (2015) referred to curriculum as a human endeavour that aims to achieve the goals of society. These ideas about curriculum led to the following question: "What kind of curriculum should we offer to university students?" (Su, 2012, p.1). Van Wyk and Higgs (2011, p. 4) asked similar questions, viz:

1. "What should be learned?"
2. "How should knowledge be organised for instruction?"

Additionally the imperative to decolonise invites critical questions, existential ones and educational ones such as: 'How should we live? ... How should we learn? What knowledge is of most worth? Whose knowledge is of most worth?' (Le Grange, 2020, p. 119).

These questions raise the issue of the nature of curriculum in terms of relevance to its community. Within this domain I reflect on the goal of this study, which is to find ways to integrate IKS into teacher education from a decolonial perspective. Lumadi (2020; 2021) argued that a curriculum should aim to eliminate social injustices that are prevalent in education and provide an education free of discrimination for all. It follows that what is

planned in schools should be inclusive and representative, in terms of content, methodology and assessment. In this context, and based on the extensive literature reviewed, current university education is described as being dominated by the Euro-Western worldview model. Van Wyk and Higgs (2011) postulated that education in Africa should be Afrocentric in nature. That is, it should promote the realisation of the goals of African society, which are developmental in nature.

Following this argument, van Wyk and Higgs (2011) suggested that the curriculum promote the mandate of universities, which includes the promotion of societal values, beliefs, and principles. This brings into play the aspect of indigenisation, where the curriculum should be a reflection of the culture (i.e. the present culture of the learners) (Dewey (1907). In this regard, the curriculum should be seen as a means of community development. The curriculum should support the fight against unemployment, underdevelopment, and social injustice (Adebisi, 2016; Hamilton-Ekeke & Dorgu, 2015; van Wyk & Higgs, 2011). More so, the curriculum should promote the acquisition of contextualised knowledge, skills, and abilities by graduates to address unemployment and underdevelopment (van Rooyen, 2016). However, the current curriculum is seen as totally irrelevant to local communities, leading to calls for decolonisation, reconstruction, and curriculum redesign (Mheta et al., 2018). Odora-Hoppers (2001) called for epistemological redress through the inclusion of indigenous people's knowledge. This is a call to value and legitimise IKS (van Rooyen, 2016). Odora-Hoppers (2001) called for a post-victimology in which curriculum should be central to connecting learners to their lived experiences, given that African students have been exposed to foreign ideologies for decades.

Mazrui's (2004) perspective that curriculum should reflect tolerance of different views [which is also supported by Chilisa's (2012) ideology of respect for diverse worldviews], promote economic prosperity, social justice and gender equality, encourage respect for the

environment, be a product of dialogue and collaboration, and evoke the search for greater wisdom. Kelly (2004) and van Wyk and Higgs (2011) proposed the notion of curriculum morality, meaning the curriculum should be liberating by promoting indigenous knowledge as an equal and valid knowledge system among other knowledge systems. In this way, intention is noted for the social and political emancipation of the colonised. The main idea here, is the need to accept diversity of thought and existence in higher education.

Curriculum is not exhaustive in terms of content, methods and assessment, but rather represents a continuous transformation and restoration aimed at adapting the educational system to the developmental needs of a community (Khuzwayo, 2021; Padayachee et al., 2018). It is therefore not advisable to approach the curriculum from a knowledge standpoint, as this risks marginalising the potential value of other knowledge systems. In this study, I base my interpretation of the term curriculum on Dewey's (1902) claim that it is a continual reconstruction that moves from the child's current experience to that reflected by the structured bodies of truth that we refer to as studies.

### **3.6 Indigenous and Euro-Western knowledge systems: A comparative lens**

Ideological dissonance was and still is a common feature of Euro-Western and indigenous knowledge worldviews (Trinos & Mudaly, 2020). Koopman (2018) described Euro-Western knowledge as empirically grounded, ontologically theory-confirming, and experimentally consistent. Simply put, this means that there is scientific evidence for every scientific claim and experimental steps are available to test a claim (Koopman, 2018, p.4). Horill et al., (2018, p.6) stated that science is based on "empiricism, quantification, reductionism, and anthropocentrism." In this vein, Ogunniyi and Ogawa (2008) argued that herbalism from an indigenous perspective, shares commonalities with Euro-Western knowledge as both have aspects of serendipity, creativity, and logic.

Koopman (2018) asserts that IK is considered scientifically inappropriate and inferior in mainstream education. Shizha (2010) considered the exclusion of IK in the education system as unjust, hence the need to challenge this normalised practice to promote development with an African perspective. Jegede (1999) and Kapoor and Shizha (2010) argued that the challenges facing Africa can only be addressed by designing development programmes that incorporate IK as a way of life for indigenous people, to highlight the potential benefits of IK in their lives. However, there are many challenges to incorporating IK into mainstream schools. Kaya (2013) noted the lack of sufficient and appropriate IK staff, inadequate or unavailable reference materials, and limited institutional support, as restrictive factors. This is a disadvantage compared to the Euro-Western knowledge system, that enjoys a large number of reference materials and high institutional support, and has been training the current generation of educators for centuries, most of whom are reluctant to challenge the existing educational environment with which they identify.

### **3.7 Understanding decoloniality**

This study is set in the context of decolonisation. One way to address decolonisation in education is to develop an inclusive curriculum (Le Grange, 2016). Decolonisation is a "restorative epistemic agenda and a process that simultaneously addresses ontological and epistemological problems that affect Africa" (Ndlovu-Gatsheni, 2018, p. 2). This means undoing the institutionalised injustices that have been forcibly imposed on Africans. In higher education (HE), it implies addressing practices that have affected education in the past and are still present today. Mahabeer (2018) and Matiwana (2019) defined decolonisation as a deconstruction approach that aims to undo the cultural assault imposed by colonialism. Matiwana (2019, p.18) explained decolonisation as "epistemic unthinking of Euro-Western constructed curricula." Thus, the process of decolonisation aims for epistemic change and identifies IK as a knowledge system that can be respectfully considered in curriculum

development. Sathorar and Geduld (2018) argued that such a shift signals an approach to a counter-hegemonic space. Therefore, decolonisation aims to address the epistemic injustice that characterised (and continues to characterise) HE in Africa. Ngugi (cited in Fomunyan, 2017) simplified the definition of decolonisation as a process of rejecting the centrality of Euro-Western culture in Africa.

Ritskes (2012, p. 1) described decolonisation as "the basis for the resurrection of IK epistemological ways of life." This aligns well with the view of Le Grange (2018), who posited that knowledge must be a product of cultural activity that is meaningful to the society from which it emerged. Ndlovu-Gatsheni (2018) also emphasised that decolonisation is a process that challenges the globalisation and universalism, that contribute to the endless dominance of Euro-Western knowledge systems over other knowledge systems. Hence, there is an urgent need for epistemic freedom versus political freedom, and for the re-humanisation of education (Maldonado-Torres, 2007). "Decoloniality is analytic of coloniality. It concerns a critical awareness of the logic of coloniality (the colonial matrix of power), it is a critique of coloniality, resists expressions of coloniality and takes actions to overcome coloniality. In other words, decoloniality encompasses the decolonisation of the interconnected domains of knowledge, power, and being in addition to the abolition of colonial administrations" (Le Grange, 2022, p. 7). Furthermore, As Maldonado-Torres (2007, p. 117) describes decoloniality as the "dismantling of relations of power and conceptions of knowledge that foment the reproduction of racial, gender, and geopolitical hierarchies that came into being or found new and more powerful forms of expression in the modern/colonial world".

In this study, I consider the decolonisation of curriculum as a process that aims to revitalise indigenous forms of knowledge, to promote relevance and a balanced, inclusive curriculum in teacher education. In a way the study will seek to decentre the dominance of the Euro-Western world views in teacher education.

### 3.8 Curriculum decolonisation and higher education in Africa

Curricula reflect the constitutional aspirations of a country, which are implemented through policy documents. Therefore, policy documents are constitutive of national aspirations.

However, Le Grange (2016) and Mahabeer (2019) argued that most African policy makers and university curricula continue to promote Euro-Western ideologies. Fomunyam (2017) described many of these ideologies as pejorative, oppressive, and less than humane, toward indigenous African epistemology. Heleta (2016a) noted that policy implementation has been slow in transforming university curricula in Africa. Payyappallimana (2006) cited the Euro-Western global dominance and the lack of familiarity with IKS among policy makers, as important factors hindering epistemological change in universities. Many African scholars agree that African universities' curricula are influenced by Euro-Western culture (Le Grange, 2018; Mheta et al., 2018; Mudaly, 2018; Ng'asike, 2019; Phiri, 2008). Senekal and Lenz (2020) noted that there is no sufficiently developed African content that could make the exclusion of Euro-Western frameworks practical, without leaving a gap. This poses an epistemic challenge to decolonising curricula because the education system is seen as perpetuating colonial interests. Ndlovu-Gatsheni (2018) suggested that coloniality should be unmasked, otherwise this would lead to the continued domination and exploitation of other epistemologies.

Academic debates suggest that colonisation has disrupted African social structure (Kaya & Seleti, 2013; Le Grange, 2016; Mawere, 2015). It is argued that colonisation has conquered crucial indigenous systems in the areas of economics, education, science, and law (Nyoni, 2017; Senekal & Lenz, 2020). This is consistent with the ideology of *ego conquiro* (I conquer, therefore I am), which focuses on how colonialism is sustained through coloniality (Maldonado-Torres, 2007). Maldonado-Torres (2020) asserts that coloniality is the

perpetuation of colonial tendencies in books, using the standards of the west as a measure of academic success, of ambitions, of self-image and reflection.

In general, university curricula in Africa are characterised by the continued legitimisation of the monocultural Euro-Western knowledge system at the expense of other knowledge systems (Kaya, 2013). This is what Le Grange (2021) referred to as a university in Africa instead of an African university and a curriculum in Africa instead of an African curriculum. This highlights an urgent need to look beyond the era of epistemic genocide and recognise that there was life and that the knowledge that sustained that life, needs to be tapped and utilised in current knowledge production and dissemination. This ideal has the potential to contribute to the decolonisation of the curriculum.

The process of decolonisation is not an easy task. Mheta et al. (2018), in their study of decolonial initiatives, raised a number of questions aimed at understanding the concept itself, viz; what content should be taught and how that content should be taught, whether it is possible to decolonise without compromising current developments in education that are globally acceptable, and how a university can rethink its architectural structure to initiate a decolonial framework. Anderson et al. (2019) raised similar questions about how to decolonise and indigenise the university landscape and what kind of governance should characterise it, proposing a dual governance system in which institutions allow and respect the coexistence of knowledge systems. Ammon (2019) added to this *tableau* of questions and inquired whether universities have reached the levels of epistemic openness for rolling out decolonisation programmes.

There is a body of scholarly work that points to possible processes through which this can happen. Mheta et al. (2018) emphasised that decolonising processes should be used to stimulate or initiate a change in thinking rather than to prescribe something. Accordingly, this

leads to the notion of complicated curriculum conversations proposed by Pinar (2011). Mheta et al. (2018) brought to light the complicated curriculum conversations suggesting that universities should be more inclusive of staff, students, management, community, and academic leaders in their efforts to successfully decolonise their systems. A complicated curriculum conversation then, is inherently a collaborative process.

Complicated curriculum conversations can lead to new insights that foster a multicultural approach to education. This includes harmonising curriculum by deconstructing Western pedagogical approaches and incorporating local ways of knowing and teaching (Koopman, 2018). Curriculum designers and implementers are then challenged to make their practices relevant by questioning whether what is being taught is worth knowing, and how it changes or affects the everyday lives of those who receive it.

Decolonisation consists of aspects of indigenous knowledge inclusion and Africanisation (Anderson et al., 2019). Decolonisation through the inclusion of IK, is aimed at neutralising the hostile university structure dominated by Euro-Western ideologies (Gaudry & Lorenz, 2018). In this case, Mudaly (2018) followed a practical, decolonial pedagogical approach in which indigenous knowledge holders were brought into universities as teachers, for specific modules. In Mudaly's (2018) study students viewed IK holders as more knowledgeable, and as having more nuanced teaching methods compared to lecturers.

Indigenisation seeks a deep understanding of what constitutes knowledge and makes an epistemic shift away from the monopoly of mainstream knowledge. Such an initiative requires a transformative, participatory, and community-based approach to knowledge construction and should emphasise "relational accountability, respectful representation, mutual appropriation, and rights and regulation" (Le Grange, 2016, p.9).

While decolonisation is contestable, it can also be considered in the context of six pillars (Ammon, 2019). These pillars include: (1) decolonisation as additive, inclusive knowledge, where researchers are asked to identify and add new bodies of knowledge to existing curricula. (2) Decolonisation as a decentering of Euro-Western knowledge. This means placing Africa at the centre of the curriculum rather than replacing it and subordinating Euro-Western knowledge to African knowledge. This implies a reorientation (Jansen, 2017a; Le Grange, 2016). (3) Decolonisation as a critical engagement with established knowledge, based on students challenging and questioning the established curriculum. This leads to a critical insight that results in new perceptions regarding knowledge production. (4) Decolonisation as an encounter with interwoven knowledge, where the focus is on classifying knowledge as something that belongs to everyone and as a reflection of lived experiences (Ammon, 2019). (5) Decolonisation as the repatriation of occupied knowledge (and society) is a critical approach that aims to interrupt the continued domestication of colonial tendencies in all their forms and to undo the existing subjugation of indigenous peoples and their practices. (6) Decolonisation as Africanisation of knowledge, based on the complete replacement of Euro-Western knowledge with indigenous knowledge. Simply put, African knowledge should reflect Africa and not be compared to or learned in conjunction with Euro-Western knowledge (Ammon, 2019). The current study was informed by a number of these pillars such as decolonisation as truly valuing IK, using voices of IK holders, learning from them, valuing their reality, valuing their modes of transmission, understanding, respecting and representing the holistic nature of learning in teacher education.

### **3.9 *Ubuntu* and decoloniality**

*Ubuntu* is envisioned as a decolonial paradigm based on the widespread perception that the education sector is plagued by significant epistemic injustices. According to Hungwe and Tofirepi (2021), the knowledge and customs of the indigenous people are undervalued in the

education systems of most of the once colonised countries throughout Africa. According to this point of view, Hungwe and Tofirepi (2021, p. 3) underlined that "this undervaluation, which is epistemic injustice, is caused by higher education culture that reflects, valorises, and perpetuates colonial concepts and worldviews."

Hungwe and Tofirepi (2021, p.3) expanded this observation highlighting that:

Epistemic injustice in higher education takes the form of a racial hierarchy of knowledge systems, where Western knowledge is located at the apex of the ranking, and indigenous knowledge systems are trivialised at the bottom. In view of this hierarchy, a misconception has been (and continues to be) established that the Western world possesses the canonical standard and monopoly on knowledge— in other words, that non-Western knowledge systems are illegitimate.

In this view "Western traditions have become the standard for all knowledge, and the methodologies underlying them are viewed as the only forms of true knowledge, which has reduced epistemic diversity. Because Western traditions hold both institutional and epistemic power, they serve as the centre of knowledge, suppressing and demeaning other types of knowledge" (Naude 2019, p.3). Seehawer et al. (2021) expanded this notion highlighting that both curriculum content, assessment and the structural set-up of education facilitate the reproduction of epistemic colonisation. In this regard, Chilisa (2016) argued that epistemic freedom must be implemented in order to solve epistemic violence. Chilisa (2012) emphasised that achieving epistemic freedom requires a sustained effort that includes examining the material being taught and the methods used to deliver it. She also urged for the democratisation of the knowledge domain. Ndlovu-Gatsheni advanced calls for establishing epistemic freedom in the following quote:

Epistemic freedom is different from academic freedom. Academic freedom speaks to institutional autonomy of universities and rights to express diverse ideas including those critical of authorities and political leaders. Epistemic freedom is much broader

and deeper. It speaks to cognitive justice; it draws our attention to the content of what it is that we are free to express and on whose terms. Epistemic freedom is about democratising 'knowledge' from its current rendition in the singular into its plural known as 'knowledges'. It is also ranged against overrepresentation of Eurocentric thought in knowledge, social theory, and education. Epistemic freedom is foundational in the broader decolonisation struggle because it enables the emergence of critical decolonial consciousness (2018, p.18).

The greatest question at this point is how best the colonised can dismantle the Euro-Western hegemony in their education system. Several ways have been proposed but in this section I describe how *Ubuntu* can be used as paradigmatic approach to decolonising education.

The nature of the curriculum can be viewed from both content knowledge and pedagogy. In fact literature reveals that both curriculum knowledge and content at all educational levels are viewed from a Euro-Western perspective. For example according to Omodan (2022, p.1), "because Western epistemic process portends a pseudo-process with complex pedagogical contours, teaching-learning processes are ineffective because they are overly Westernised". This calls for alternatives so that learning becomes productive and effective at all educational levels. Decolonial movements must therefore include a lodge for an all-inclusive educational approach that takes into account intercultural competence and the "heterodox of being human," which encourages human openness (Fataar, 2018, p.vii). In fact Fataar (2018) is of the view that such an approach will eradicate knowledge parochialism and decongest the idea of knowledge superiority in curriculum matters.

Decolonial agitations proposed approaches that are rooted with the *Ubuntu* philosophy. For example Omodan (2021) proposed Ubuntuology as an alternative to the current pedagogy that is mirrored from a Euro-Western worldview. In the same vein Ngubane and Makua (2021) proposed an *Ubuntu* pedagogy as an alternative to the current Euro-Western ideologies characterising teaching and learning in higher education. Ngubane and Makua (2021) argued

that *Ubuntu* pedagogy should be intersected with social justice in order to respond to learners' cultural competencies.

Ubuntology is a science of teaching and learning inspired from an Africanised philosophy called *Ubuntu* (Bangura, 2017). The word Ubuntology was coined because of *Ubuntu*, which stands for humanity, love, compassion, oneness, and kindness. *Ubuntu* literally translates to "humanity" and "being humane," as well as "fellowship," "kindness," and "brotherliness," among other things. Its etymology can be traced to a variety of African languages and cultures, including Shona, IsiNdebele, IsiSwati/IsiSwazi, IsiXhosa, Yoruba, and IsiZulu ( Ngubane & Makua, 2021, p. 3). *Ubuntu* was referred to as an Africanism by Omodan and Dube (2020) because it was thought to be peculiar to the African community. This is also evident in the Zulu proverb "*umuntu ngumuntu ngabantu*," which means that a person becomes who they are through others (Letseka, 2014).

*Ubuntu* as a philosophy is based on communal existence derived from commonly shared cultural values and practices (Murove, 2014). *Ubuntu* identifies with aspects of interdependence, harmony, hospitality, generosity, caring and compassion (Hungwe & Tofirepi, 2021, p.3). The ultimate goal of the *Ubuntu* ideology is to restore cultural identity of the African people through decolonisation (Hungwe & Tofirepi, 2021). *Ubuntu* according to Matolino and Kwindigwi (2013) seeks to foster self-identity and human dignity of the once colonised. As an expansion on cultural identity Afonso-Nhevalo (2021, p.14) posited that *Ubuntu* offers holistic decolonial framework rooted in "African epistemologies, ontologies, and axiologies". From the curriculum's point of view *Ubuntu* offers ethical methodological platforms on how to teach leveraging on relational and holistic pedagogical approaches (Seehawer, 2021).

The use of indigenous games in teaching and learning is one approach that can be used to decolonise education based on the *Ubuntu* ideology (Chimbi & Jita, 2022). The question is how indigenous games promotes decolonisation through *Ubuntu* philosophy. Nxumalo and Mncube (2019, p. 113) established that: “The games build a sense of collective and collaborative spirit by teaching African children to embrace the values of selflessness, commitment to the bigger picture and sharing in order to survive”. From the above observation indigenous games in education discourage individualism and foster team spirit (Chimbi & Jita, 2022). However, Chimbi and Jita (2022) questions the readiness and preparedness of teachers to engage their learners with these games. It should be noted that against this setback *Ubuntu* values of solidarity, care, patience, and respect empower learners to support each other in their learning (Chimbi & Jita, 2022, p. 6).

The conceptualisation and embracing of *Ubuntu* in education depends on the how institutions and individuals are interested in promoting a just education system that is defined precisely by *Ubuntu* pedagogy (Ngubane & Makua, 2021). Ngubane and Makua argued that:

*Ubuntu* pedagogy, when embraced with understanding and dignity it deserves, has the potential, firstly, of initiating students from other cultures other than African cultures to the values of *Ubuntu* and, secondly, of reconnecting students with their values and cultures, but it has a capacity to cultivate social justice values of equity, recognition and fair participation amongst students from diverse social backgrounds (2021, p.1).

Universities in the formerly colonised nations are encouraged to play a role in re-connecting students with their values, traditions, and cultures. This therefore implies that universities are the most conducive environments for the revival of the *Ubuntu* philosophy. The task for universities is to function as repositories of indigenous knowledge and African values (Ngubane & Makua, 2021). Therefore, from an *Ubuntu* pedagogical perspective, it is vital to re-evaluate how teaching and learning are carried out in higher education (Ukpokodu, 2016).

In this regard, Ngubane and Makua (2021, p. 3) argued that "the *Ubuntu* philosophy, which is an indigenous knowledge system and way of life for African people, when embodied with the respect and dignity it deserves, has the potential to not only restore indigenous values, heritage, and cultures among students, but also to promote values of coexistence and social cohesion among students from different backgrounds."

Furthermore, Ukpokodu (2016) described six principles that define the *Ubuntu* pedagogy: recognition of self and others, building positive relationships, getting students to work cooperatively, nurturing of the students' minds, teaching from a position of love and care and utilising students' linguistic resources to promote meaningful learning.

Recognition of self and others- By participating in activities and interacting with others, humans grow a sense of identity and belonging. Simply said, one's identity can be revealed by others. As a result, the *Ubuntu* pedagogy emphasizes participation and group learning. Active learning, which includes participation, interactions, and sharing of ideas, knowledge, and experiences, promotes effective learning. Learning depends on having a good understanding of oneself and other people. Understanding who you are means being aware of your virtues and accepting your flaws. You may identify people' strengths and shortcomings when you understand them.

Building positive relationships- This feature of the *Ubuntu* pedagogy, which fosters peace and harmony in the classroom, encourages students to respect one another and their teachers as adults in the learning context. In order for learning to take place, students must first embrace one another and then appreciate one another as people. In the classroom, love fosters compassion, understanding, forgiving, sharing, and peace. Love among students ensures that they share resources and spaces for learning with one another in addition to knowledge (Ukpokodu, 2016).

Getting students to work cooperatively- Another essential component of *Ubuntu* pedagogy is collaboration. It encourages pupils to work together as a team to solve challenges in the classroom. Solidarity, sharing, respect for one another, and equitable opportunity are the bedrocks of effective cooperation. Each team member is crucial to good learning experiences in an efficient teamwork. The contributions of each member are respected and vital. Working together encourages the *Ubuntu* principle of "for I know, so you know" in the classroom, where students care for one another's physical needs by sharing furniture and learning resources but also by sharing information to advance one another's cognitive development (Ukpokodu, 2016). Therefore, *Ubuntu* pedagogy places a strong emphasis on mutual support.

Nurturing of the students' minds- Participative and interactive learning are prioritised in *Ubuntu* pedagogy. Interaction between ideas, thoughts, and experiences helps students learn more effectively. Participation is increased through interaction with the course material. Engagement with the learning material is encouraged by active learning. Students are given the chance to talk about the issues, ask questions, debate ideas, and share their thoughts and experiences. These classrooms support students' cognitive growth. They develop the minds of students and increase their learning opportunities (Letseka, 2014).

Teaching from a position of love and care- *Ubuntu* cannot really be discussed without including humane deeds like love, kindness, sympathy, respect, and solidarity. Without love, education becomes merely an ideology (Blackwood 2018). Higher education lecturers may use a range of teaching methods, but if they lack passion for their students and their subject matter, students won't be inspired by their efforts. If a lecturer is unloving and frequently speaks and behaves in ways that are contradictory to love, whether intentionally or unintentionally, it may disempower students and cause them to lose respect for the lecturer.

Utilising students' linguistic resources to promote meaningful learning- *Ubuntu's* educational philosophy's ultimate purpose is to embrace linguistic diversity (Ukpokodu, 2016, p.188). Students interpret the world and reflect in depth through the use of their native languages. Students' identities and the honour of their native languages are restored when they are used in tandem with the language of instruction and learning.

### **3.10 Inclusion of indigenous knowledge in education**

In terms of curriculum development, it has been argued that the curriculum should be relevant to the communities it serves. Shizha (2014) argued for a multidisciplinary, hybrid curriculum. Such a curriculum is multicultural and creates democratic spaces for the engagement of all stakeholders. Shizha (2007) opposed the marginalisation of IK.

Mosweunyane (2013) argued that education prior to colonisation focused on survival skills and community development in general. The penetration of European-Western knowledge into African communities is believed to have redirected Africa's development path negatively (Mosweunyane, 2018). Therefore, the inclusion of IK in teacher education needs to be examined in terms of its potential advantages and disadvantages.

African scholars around the globally, are immersed in a curriculum discussion in which decolonisation and indigenisation are the buzzwords. Decolonisation and indigenisation are convincingly argued for in the works of Mpofu (2016), Shizha (2006; 2007; 2010), Odora-Hoppers (2001), and Kaya (2013), among others. The nature of the existing curriculum has been questioned. This takes us back to Socrates, who argued that knowledge can be either important or trivial (Wolfsdorf, 2004). In his view, trivial knowledge is knowledge that does not equip the person who possesses it with the appropriate knowledge, skills, and wisdom to survive (Wolfsdorf, 2004). Important knowledge, on the other hand, is associated with ethics and moral values that determine a person's way of life.

Schneider (2013) drew on the ideas of Socrates and equates the Euro-Western model of science education with trivial knowledge. Schneider argued that Euro-Western education exposes students to abstract and difficult concepts, leaving them with no choice but to memorise. Through this experience, the development of wisdom and expertise is compromised the student's potential. Instead, these students are forced to learn by rote in order to pass exams. In other words, the idea that curriculum is a cultural extract, is violated. In this study, therefore, I advocates for the curriculum that reflects students' lived cultural experiences and prepares them for a lifetime of survival and learning.

In light of the above, it is necessary to consider who the knowledge impacts, who produces it, and for what purpose that knowledge is produced and taught (Apple, 2018; 2016). This brings into play the question raised by Socrates of whether we have a unitary system in which a particular school of thought has the authority to determine what should be included in the curriculum (Wolfsdorf, 2004). Therefore, in this study I argue that the Euro-Western model of education imposed on African communities, violated principle of creating truth and knowledge from within. The Euro-Western system adopted a violent approach in that it rejected the African education system without attempting to learn from what already existed (Heleta, 2016b). Hence, there is a clear call for curriculum realignment by decolonial advocates.

### **3.11 Towards a just curriculum: The colonial epoch in Zimbabwe**

The road to establishing a just curriculum leads back to colonial times. The precedent for curriculum transformation in Zimbabwe arose from the nature of the curriculum, which was predominantly intellectual and culturally silent. Zimbabwe had the Education Ordinance Acts of 1899, 1903, and 1907, and these Acts were not distinguished by anything other than being rather intellectual and producing students for the labour market. Subsequently, Zimbabwe

saw the promulgation of the Development of Native Development Act of 1929, the Compulsory Education Act of 1930, the African Education Act of 1959, and the Education Acts of 1973 and 1979 (Kariwo & Shizha, 2012).

### **3.12 Towards a just curriculum: Zimbabwean and African contexts**

Zimbabwe gained its independence in 1980 and the change in political administration meant an awakening in academia. As reported by Chivore (1990) a new curriculum was introduced in 1981 under the auspices of Education with Production. This curriculum emphasised practical subjects above all else. This was followed by the revision of the curriculum in 1982. The struggle to localise the curriculum, based on the realisation that Zimbabwe inherited a British curriculum, was and is an ongoing process. In 1993, the Zimbabwean government initiated the localisation of examinations. This was an attempt to sever the colonial umbilical cord from a British-dominated curriculum assessment. Subsequently, the Commission of Inquiry into Education and Training was established. This was one of the bodies that recommended the indigenisation of knowledge production and dissemination. The Commission not only outlined what should be done, but also highlighted some legal, regulatory approaches that maintained the dominance of the British education system in the country, including:

1. The 1962 Judges Commission, which stipulated the use of English as the only language of instruction. This amounted to linguicide which removed African learners from their cultural languages and forced learning in a foreign language. Many people see English as a dominant language worldwide. So anyone who cannot present themselves in English is deemed to be illiterate. Even academic research is expected to be presented in English. It is possible that this linguistic preference limits community participation in education. This scenario makes outsiders masters and

dictators of what should be done in African communities. In other words the process contributes to the externalisation of knowledge.

2. The Education Act of 1987, amended in 2006, enshrined the right to education as a fundamental right due to every child. What has not been addressed in the amended Act, is what should be taught. However, an attempt was made to include mother tongue instruction, in a regulated manner.
3. The Constitution of Zimbabwe Amendment Act 20 of 2013 focused on inclusivity, fairness, equity, relevance, equality in language use, respect for cultural heritage (Article 16), preservation of traditional knowledge (Article 33) and the right to education (Article 75) (Government of Zimbabwe (GoZ), 2013).

The principles of preserving traditional knowledge and respecting cultural heritage aim to produce a learner who is rooted in his or her culture, has a clear identity, and is prepared to solve community problems. Indeed, the Zimbabwe Framework Curriculum 2015-2022 supports this classification by arguing that learners should demonstrate an awareness of national identity and cultural heritage (Government of Zimbabwe (GoZ), 2015).

In summary, postcolonial education in Zimbabwe, as in the pre-colonial era, has been described as a tool to support the political gains of those in power (Matsika, 2000). This has led to a system in which students' learning institutions and their homes are out of sync in terms of knowledge production and dissemination. Matsika (2000) called for a bridging of home/traditional practices with those of learning institutions. It is argued that the two can complement each other and create relevance for the education system. However, since the education system was and is defined within the inherited curriculum, Shizha (2007) argued that IK had and still has commendable respect among many indigenous communities. Shizha (2010) asserted that IK is wisely produced and preserved in communities. What is lacking is

tapping into it and using it in our education to promote scientific programmes that incorporate IK practices and epistemologies (Zinyeka, 2014).

Shizha (2010) argued that academics and researchers in Zimbabwe are conservative and cling to the knowledge inherited from colonial masters. Shizha (2010) also emphasised that academics in Zimbabwe are afraid to challenge the established knowledge base in the curriculum. These observations were made at all levels, as Shizha's research works span from elementary school to tertiary levels. As a result, education in Zimbabwe is characterised by colonial dictates that are being normalised. Criticisms of coloniality in education create spaces for new, democratic approaches toward re-imagining, restructuring and transforming the curriculum.

Sibanda and Young (2019) believed that Zimbabwe's post-colonial education system needs to be redesigned. This is consistent with the general observation that there are challenges associated with the existing curriculum, which lacks inclusivity, representation, and reflection of students' lived experiences. However, Shizha (2010) argued that redesigning the curriculum has become a contentious issue worldwide. For this reason, incentives for curriculum change have been established, which include funding for projects which centre African systems (Shizha, 2010). Shizha (2007) also questioned why there are colonial continuities in curricula and why IK continues to be marginalised by curriculum planners in Zimbabwe, and in Africa as a whole (Shizha, 2007).

### **3.13 Gaps in literature**

A literature review for this study indicated that different knowledge perspectives exist, however, it emerged that the Euro-Western ideological orientation dominates the functionality of different sectors of life (education and health provision included). Although literature is awash with the need to decolonise the curriculum, little research if any has been

done to link indigenous knowledge of managing infections with the teacher education curriculum. This is based on a literature review I conducted using bing, yahoo, and google scholar. Furthermore, little has been done to promote curriculum conversations that respect community sages and pre-service teachers, as potential participants or stakeholders in curriculum development. In reality, complicated curriculum conversations that include the silenced and non-influential members of the community such as students and IK holders, has not been well pronounced in curriculum decolonial discourses. This observation motivated the orientation of this study, in which the process of decolonising the curriculum should start from understanding community knowledge and practices to identifying the best approaches for respectful representation into the curriculum. The significance of it all lies in establishing a curriculum that is relevant and contextualised rather than supporting a ubiquitous knowledge system from which people are disconnected.

### **3.14 Summary of chapter**

The chapter detailed research on infectious diseases, indigenous knowledge, curriculum construction, decolonisation of curricula, and a comparative analysis of IK with Euro-Western ideologies. Generally Africa is perceived to be at risk of being affected by infectious diseases because of its relative position of being underdeveloped. Literature revealed that Africa has its own unique, indigenous ways of dealing with infections. However, the literature has shown that IK and Euro-Western views on how to deal with infections, are ideologically different. Furthermore, this review revealed that university curricula in Africa are rooted in the Euro-Western perspectives, a scenario that needs to be addressed so that epistemic pluralism is achieved. Consequently, there are loud calls for the university curricula to be redesigned so that what is learnt becomes contextually relevant to the students specifically, and wider communities more generally.

The methodology that shaped my study will be presented in full in the following chapter.

**CHAPTER 4****RESEARCH METHODOLOGY**

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#### **4.1. Introduction**

Every study is informed by a particular methodology that informs the setting, selection of participants, data generation, data analysis, and trustworthiness. The current study is located within the decolonial framework. Ideally, the nature of the methodology is informed by exercising critical reflexivity, reciprocity and respect for self-determination, embracing “other(ed)” ways of knowing, and embodying a transformative praxis (Thambinathan & Kinsella, 2021, p. 1). In other words decolonial methodologies promote the need to recover the lost identities of the colonised through promoting self-determination, empowerment, and social justice (Dorpenyo, 2020). Aligning itself with this view, the current study was located within the critical paradigm with the broad aim of challenging the conventional knowledge bases and methodologies that characterise university curricula in Africa.

In this chapter a detailed overview of the geographic, methodological, and conceptual context of the study is provided. In addition, this chapter provides a schematic overview of the methodology. A detailed description of the critical paradigm and its application to this study follows. The methods of selection of the research participants is then outlined in full. This is defined by the selection of Karanga healers (KHs) for interviews, pre-service teachers as participants and the selection of documents for analysis.

This chapter also details the data generation process. Furthermore, it focuses on the development of instruments for data generation, the actual data generation process, and the data analysis process. An explanation of research rigour, that focusses on trustworthiness which is based on credibility, confirmability, dependability, and reflexivity, is submitted next. This chapter also presents aspects of ethical considerations, including medical ethics, efficacy and safety, gatekeeper permission, informed consent, voluntary participation, anonymity, confidentiality, and data use, its storage, and finally, data disposal.

The chapter also describes the limitations that were encountered during the study and how these were addressed to arrive at authentic findings, conclusions, and recommendations.

## **4.2 Context of the study**

Study contexts can be geographic, social, institutional, and/or individual (Yin, 2016). This study was carried out in two contexts. These were the rural setting (social) and the university setting (institutional). In this regard, using a variety of contexts in qualitative research increases the value and credibility of the study, Yin (2016). The use of the two contexts helped to create the much-needed connectedness between academic institutions and the communities they serve.

### *4.2.1 The rural setting*

Phase one of the study was conducted in the Makuwerere area, Mberengwa South in Midlands Province, Zimbabwe. Mberengwa South is a district that encompasses several political districts. This study was carried out in District 24, which is commonly known as Makuwerere. In this district, there is one rural clinic, one secondary school and two primary schools. There are twenty village heads under the leadership of Kraal Head Makuwerere. Each village head is responsible for approximately forty homesteads. The people in the area are mainly Karanga-speaking, although ethnic diversity is increasing due to intermarriage and resettlement. Thus, there are also *Ndebele*, *Pfumbi*, and *Tshangani* in the area. Despite this diversity, the predominant traditions are those of the Karanga people. Karanga people are a group of people mainly living in the Midlands and Masvingo provinces in Zimbabwe. Fehrsen (2010, p.1) identifies the “Karanga community, a subgroup of the Shona people of southern Zimbabwe. The well-being of this subgroup is rooted within their religion anchored in rituals from rituals for rainmaking and fertility of the land, to inter- and intra-tribal

harmony, family well-being, and the health of the individual. The explanation, diagnosis, and treatment of misfortune and illness contribute to wellness, balance, and harmony in the community, by restoring relationships, by retribution, and the paying of damages". The Karanga have a strong belief in *Mwari* their god who is approached through the intermediaries known as *Vadzimu* (spirit mediums) (Makamure & Chimininge, 2015).

Geographically, the area is located in natural agricultural region five, which receives little rainfall, i.e. less than 600 mm per year. Therefore, the area is prone to droughts and high temperatures. The people of the area generate their income from subsistence farming and keeping animals such as goats and cattle. Crops grown in the region include sorghum, finger millet, *rapoko* and groundnuts, which are resistant to drought. There are deposits of emeralds, chrome and gold in the region. However, these deposits are not fully exploited as many people in the region make a living from illegal gold panning and open pit chrome mining.

Traditionally, the area is ruled by a chief. The chief works with a council of headmen and kraal heads. Politically, the area is governed by an elected council member. Traditional and political leaders work together to maintain a socially, economically, and politically consolidated community.

#### *4.2.2 The university setting*

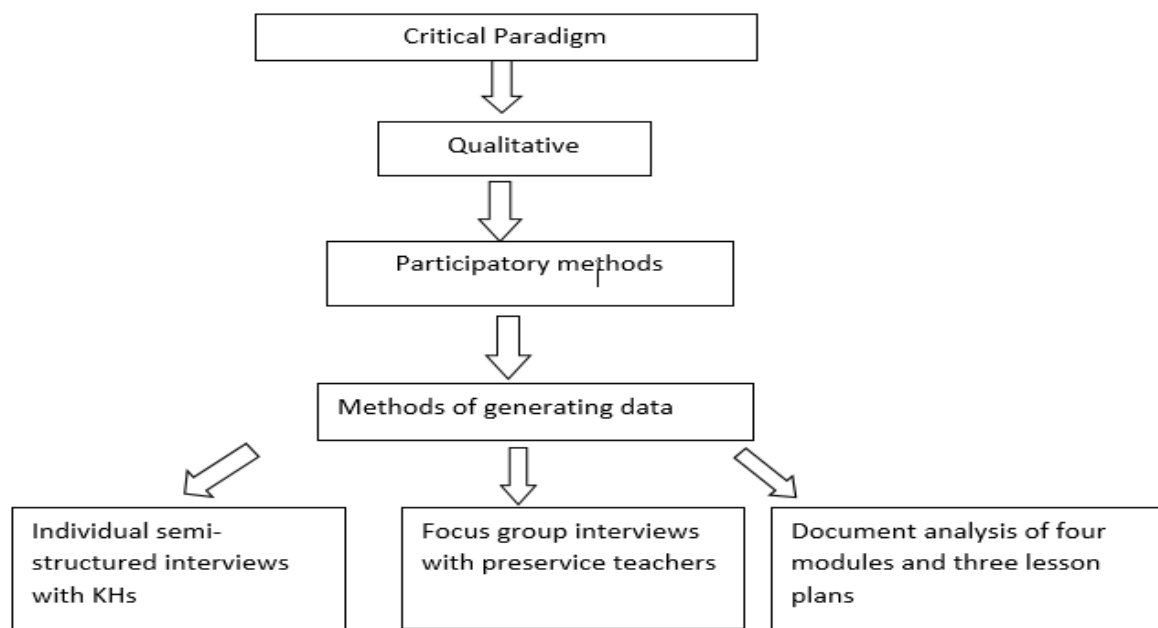
Phase two of the study was conducted at a university in the city of Gweru, the provincial capital of the Midlands, one of the ten provinces in Zimbabwe. The university offers a range of undergraduate and postgraduate courses to students from both rural and urban areas. Most of the students are from rural areas and thus belong to the lower socio-economic class. Some students even come from the Makuwerere area, the research setting for phase one. The student body is ethnically diverse. This study was conducted in the Faculty of Education. The

curriculum of interest was the Biology curriculum for pre-service teachers. This course is relevant to the study because it offers a number of modules on infectious diseases.

### 4.3 Methodological overview

**Figure 4.1**

*Methodological overview (Source: Researcher)*



### 4.3 Research paradigm

A paradigm is a system of thought which is associated with acceptable theories, traditions, approaches, and methods that guide research. Perena (2018) described a paradigm as a general framework or points of view, literally, points from which to see. It provides ways of looking at life and are based on a set of assumptions about the nature of reality. Therefore, a paradigm defines or creates a roadmap for the research process (Hammed, 2020; Verwey, 2015). A paradigm can be viewed from the epistemology, ontology, axiology, and

methodology perspectives (Denzin & Lincoln, 2017; Fusch et al., 2018; Thanh & Thanh, 2015) The epistemological dimension is concerned with the nature of the relationship between the researcher and the knower (Mohajan, 2018). Perena (2018) described the ontological dimension as a relationship with the nature of reality. Aliyu et al., (2015) and Perena (2018) posited that an ontological assumption focuses on how humans relate to their cosmos, including plants, animals, and the earth. The axiological dimension is about what is considered valuable in learning (Aliyu et al., 2015; Perena, 2018). Perena (2018) described the methodological dimension as a set of procedures used to generate knowledge. Common paradigm models include positivism, constructivism, critical?, postmodernism, and pragmatism.

As this study was rooted in the principles of equality, social justice and reconstruction, the critical paradigm was considered the most appropriate philosophical approach. Pham (2018) argued that research guided by the critical paradigm aims to challenge power imbalances in society. The aim is to work towards equality and social justice in all systems (Pham, 2018). It is argued that university curricula in most African countries did not change after independence (Heleta, 2016b), but in reality, change is mostly informed from a policy position and not being implemented (Heleta, 2018; Lwandle & Yallem, 2020).

The critical paradigm aims to give voice to the oppressed (Walker et al., 2019). This study adopted a socially transformative agenda that values collective and inclusive action to effect social change. According to Lockett and Shay (2020), a critical paradigm triggers change, prompts critical action, and transforms experiences. In this case, the focus was on decolonising the current teacher curriculum, using four selected modules related to infectious diseases. Such decolonisation was envisaged to lead to culturally sensitive teacher education and promote equitable representation of knowledges in teacher education.

In fact, the existing university curricula thrive by devaluing other knowledge systems and normalising the acceptance and dominance of a monolithic episteme (Adyanga, 2014). This idea was supported by Zengeya-Makuku et al. (2013) who argued for equal treatment of all forms of knowledge systems and worldviews. Matiwana (2019) contended that curricula should be culturally relevant. The focus here, was not only on identifying possible ways to include IK in the Biology curriculum for teachers, but also on pre-service teachers' pedagogical practices of incorporating indigenous knowledge in their lesson planning and modules.

#### **4.4 Research approach**

Research approaches are plans and systems for investigating general assumptions, to well-defined techniques for collecting, testing, and analysing data (Creswell, 2014). Creswell (2014) distinguishes among qualitative, quantitative, and mixed strategies, in research management. Because this study was situated within the critical paradigm, qualitative methods were used. Mertens et al. (2013, p. 296) highlighted that qualitative strategies "are used in research that aims to portray a particular program, practice, or setting from the inside out". Qualitative research was suitable for this study because it involves direct inquiry into the practice network to capture participants' perspectives, beliefs, and accounts, leading to deeper inquiry and understanding of habits (Chilisa & Kawulich, 2012; Mertens et al., 2013).

In this regard, qualitative research tends to focus on understanding the entire phenomenon under study rather than individual components. Moreover, qualitative research methodology promotes a comprehensive description of the phenomenon under study, thus facilitating the interpretation of study findings for non-academic audiences (Merriam, 2002). In addition, Corbin and Strauss (2008, p. 12) asserted that qualitative research "allows researchers to probe participants' inner experiences, determine how meanings are formed by culture and

within culture, and discover rather than test variables". Additionally, the adoption of qualitative research was based on its flexibility (Creswell & Poth, 2018). Consequently, the research process can be changed to accommodate both, situations that were unforeseen during the research proposal stage, and those that emerge during the research process.

#### **4.5 Research design**

Research designs are described as techniques that guide research explorations (Busetto et al., 2020). Qualitative research designs include ethnographic, case-based, phenomenological, grounded, and participatory approaches (Creswell & Poth, 2018).

This study was guided by participatory methods which were suitable because (among other reasons), they create spaces for mourning (Chilisa, 2012), where people from extremely disadvantaged communities identify with and reflect on issues that negatively impact their lives. Participatory methods also enable the development of perspectives for positive change (Chilisa, 2012). Importantly, participatory methods involve a collaborative process of knowledge production that leads to new knowledge on the part of the knowledge holders, the researcher, and other stakeholders (Bergold & Thomas, 2012). Therefore, participatory methods shift research from the general norm expand to collaborative activities. Participatory approaches also promote democratic involvement, by fostering trust and good relationships with participants (Cook, 2012), who may be underprivileged (Bergold & Thomas, 2012). A unique goal of participatory methods is to reconstruct the knowledge of the disadvantaged by seeking understanding (Bergold & Thomas, 2012). In working with the marginalised, participatory research creates opportunities for researchers and participants to develop a deep understanding of scenarios that have perpetuated (and still perpetuate) social inequalities. This challenges a scenario that continues to privilege one knowledge system (Euro-Western) over others (Mudaly, 2018). As indigenous peoples and their practices continue to be

marginalised in higher education, participatory methods are important in making the voices of the oppressed heard and in contributing to epistemic freedom. The use of participatory methods was necessary for uncovering important indigenous practices related to disease management of KHs and in creating opportunities for the inclusion of IK in the Biology education curriculum for pre-service teachers.

The community knowledge base on disease management serves as a springboard from which IK can be reclaimed, revived, remembered, and rethought in Zimbabwe. Therefore, collective engagement was one of the key strategies for decolonising the curriculum by engaging the latent and dormant voices of the local people. The principles of participatory methodology are based on the democratisation of knowledge production. It is an approach that is culturally sensitive to knowledge generation, is ethical to the broader community, and honors and respects indigenous communities as people who have the capacity to determine their own academic destiny in a changing world. Finally, it aims to initiate social change that respects rather than devalues existing norms, and recognises the need to redress social imbalances that continue to characterise higher education. This is supported by Mertens (2007) in relation to ethics, where the community should be at the centre of addressing inequities. According to Mertens (2007), social justice theory should be complemented by rights-based theory within participatory methods. Mertens' rights-based theory calls for addressing social inequalities at all societal level (Mertens, 2007). Thabethe and Reddy (2021) proposed a coordinated approach to knowledge production between institutions and the community. This buttresses the choice of the university, and the Karanga community in my study. King and Schielmann put it this way:

Identifying and incorporating relevant local cultural knowledge with the participation and informed consent of Indigenous communities and Elders, particularly in relation to the selection, sharing and documentation of this knowledge- in the planning of

programmes, selection of teaching methods, design of curricula and production of educational materials for academic institutions (2004, p. 34).

This is an approach to empowering the voiceless and closing the knowledge gap. An action-oriented but collaborative approach to knowledge production, dissemination, and implementation is what constitutes the participatory methods in this study. In the initial phase, the content and practices of IK were studied using a collaborative knowledge production approach between myself and the KHs. The idea that community knowledge is irreplaceable, requires an action-oriented approach that leads to transformation and social change (Burns, 2011).

#### **4.6 Selection of participants and data sources**

Before the selection of the participants, I sought for ethical clearance from the research office at the University of KwaZulu Natal, which was granted. After this I sought permission for accessing and using Biology modules for pre-service from Midlands State University, which was granted. I also sought permission from Chief Chingoma to carry out my research in his area. Being a Karanga and having grown up in the Makuwerere area I knew the Chief. However in seeking audience with him I had to consult with his aides who made an appointment on my behalf. I then requested the participation of Karanga healers and pre-service teachers.

In any study not all members of a community can participate. As such selection is done through sampling. Sampling is a process of selecting units from a population of interest so that the results of the sample can be generalised to that population (Alvi, 2016; Taherdoost, 2016). In this study, a non-probability sampling approach was used. Non-probability sampling can be voluntary sampling, purposive sampling, quota sampling, snowball sampling, matched sampling, and genealogy-based sampling (Alvi, 2016; Gentles et al.,

2016). I used purposive sampling to select participants in this study. Purposive sampling is the selection of research participants based on the researcher's judgment that the perceived participants are appropriate for the intended purpose (Alvi, 2016). Palys (2008) identified stakeholder sampling, deviant case sampling, typical case sampling, paradigmatic case sampling, maximum variation case sampling, criterion sampling, critical case sampling theory guided sampling, critical case sampling, and disconfirming case sampling as the different form of purposive sampling. In this study I used criterion sampling to select Karanga healers were viewed as knowledgeable experts within a particular cultural domain. The selection criterion for the group of participants is described in the following subsections. Palys (2008) described criterion sampling as a process of searching for cases or individuals who meet a particular criterion.

#### *4.6.1 Selection of KHs*

I purposively selected ten Karanga healers (KHs) as the first group of participants. This selection was based on the recommendations of chief Chingoma. Martínez-Mesa et al., (2016) underscored the importance of involving a senior member of a group in the process of selecting participants for a study. Martínez-Mesa et al., (2016) argued that a senior member can provide suitable participants, although they did not rule out the possibility of bias due to subjectivity and how that person interacts with potential participants in their daily tasks. Therefore, the selection of the ten healers from the Karanga community was based on quality criteria.

There is no agreed upon sample size for inclusion in a study, therefore many qualitative researchers opt for saturation of data, as a cut-off criterion for further recruitment of participants (Fusch et al., 2018; Mason, 2010; Saunders et al., 2018). For the purposes of this study, a specific number of KHs (ten) was determined based on insights from Guest et al.,

(2020) and Saunders et al., (2018), who emphasised that in most cases, saturation is achieved when data is collected from eight to twelve participants.

In terms of quality, the local chief was asked to recommend ten KHs that had a reliable track record of diagnosing and treating infectious diseases successfully, and had extensive experience in indigenous practices such as herbal preparation, field identification, and ethnic medicinal plant collection. In a sense, this introduced an element of referral as a means of selecting participants, to the purposive sampling technique. Ease of access (convenience), as recommended by the chief, was also considered. The chief was deliberately approached because he is responsible for the overall health of the community. The roles of the Chiefs are defined in the Zimbabwean constitution where they are expected a) to promote and uphold cultural values of their communities and, in particular, to promote sound family values; b) to take measures to preserve the culture, traditions, history and heritage of their communities, including sacred shrines; c) to facilitate development (GoZ, 2013). Therefore, his recommendations were relied upon to obtain the most suitable sample to generate findings relevant to the key research questions in the current study. I was of the view that the KHs and practices of the Karanga people are unique and valuable, and therefore need to be explored and utilised. This was supported by Mawere (2015) stating that indigenous peoples have confidence in their knowledge which is taken for granted by those who value the Euro-Western perspective.

#### *4.6.2 Selection of pre-service teachers*

For the selection of the participating pre-service teachers, the first five volunteers who were interested in the concept of decolonising the curriculum, were included in this study. The criterion for selecting the pre-service Biology teachers was the fact that they were studying modules on infectious diseases. In addition, they were still in the process of acquiring

knowledge and skills related to content and pedagogy, and therefore could provide practical and reliable data on the inclusion of IK in the Biology teacher education curriculum. In turn, they were empowered as agents of change in their communities.

#### *4.6.3 Selection of modules and lesson plans for analysis*

The curriculum for pre-service Biology teachers is extensive and includes pedagogy, professional development, and Biology (content) for educators. I purposely selected Biology for educators because it has some modules of interest for this study, namely virology, bacteriology, parasitology, and immunology.

All the lesson plans collaboratively created by the pre-service teachers were subjected to data analysis.

### **4.7 Data generation methods**

Data generation refers to the theory and methods used by researchers to gather data from a sample (Goldkuhl, 2019). The sole purpose of data generation was to answer the research questions. The tools and instruments used for data generation are summarised in the following table.

Table 4.1

*Outline of participants, sampling, data collection, and study purpose*

Participant/resource	Number used	Sampling technique	Research Question	Method	Purpose
KHs	10	Purposive	1	Individual semi-structured interviews	To explore IK and practices of infectious diseases of the KHs
Biology modules	4	Purposive	2	Document analysis	To analyse curriculum content and pedagogy on infectious diseases
Pre-service teachers	5	Purposive	3	Focus group interviews	To determine what IK to include, how to integrate IK, and possible challenges
Lesson plans	3	Purposive	3	Document analysis	To determine extent of inclusion of IKS

Documents (four Biology modules for pre-service teachers and three lesson plans) and semi-structured interviews were used in data generation. Photographs related to IK were shared through WhatsApp by KHs and some were taken by the researcher. These methods of data generation were based on insights from Busetto et al., (2020), Sutton and Austin (2015) and Yin (2018) who identified interviews, observing (including participant observation), collecting and examining of samples, as the best qualitative methods for data generation. Yin (2016) further emphasised that the credibility and usefulness of each method depends not

only on its application, but also on the type of research instrument used and the development of a well-defined data collection procedure. In this study, each method was applied during a fixed time period. Yin (2016) argued that a qualitative methodology should be adaptable and flexible to flow and adjust to different scenarios. In this study both KHs and pre-services teachers operated within a flexible participation timetable, where they could respond whenever they were available. This was achieved by sending audio or typed questions (for telephonic interviews) to them, and they responded according to their convenience.

#### *4.7.1 Research instruments*

The success of any research is rooted in the type of instruments used to guide the research process. In qualitative research a number of instruments can be used. For this study I used self-generated interview schedules (for KHs, see appendix G), focus group interview schedule (for pre-service teachers), document analysis guides (for Biology modules and lessons- see appendices I and J respectively), and myself as an important instrument. In the following section a brief description of each of the instruments is given as they applied to the study.

#### *4.7.2 Researcher as an instrument*

The researcher is pivotal to the research process because he or she has perceptions that can be crucial in transforming field data into meaningful data (Wa-Mbaleka, 2019). In this case, Pezalla et al. (2012) emphasised that the researcher's characteristics are important in data collection, interpretation, and reporting. These authors lent to the view that I played a key role by taking field notes, reconstructing field notes, transcribing audio information, creating spaces for open participation, selecting salient aspects to find patterns that lead to themes, assigning meaning to data, and including relevant and appropriate data (Barrett, 2007; Pezalla

et al., 2012). The researcher as an instrument is expected to promote interaction and connectedness with the participants and the data (Wa-Mbaleka, 2019).

In this study, I was an active facilitator of the research process. The interview spaces were designed to be as conversational as possible, by establishing a good rapport with both sets of the participants Mallozi (cited in Pezalla et al., 2012). In addition, I was the transcriber of all data and a co-analysed of all research data with pre-service teachers. I was also the sole literature reviewer, with only relevant literature included in the final report. During the process, I engaged in depth with the data and literature, which kept the study in focus as data and literature were continually reviewed, thus using a reflective lens. Reflections on possible self-bias based on my background and perceptions, was suppressed through shared democratic participation, the attempted elimination of power imbalances between me and the participants, and the creation of boundary-less meetings (Shenton, 2004).

Overall, I aimed to be attentive, self-aware, authentic, process-oriented, make connections between related data and interpretations, be open to information, allow participants to be open and yielding to their experiences, engage in on-going changes by being flexible. This also contributed to trustworthiness of the research findings.

#### *4.7.3 Interview schedule for KHS*

The interview schedule for the KHS was designed to focus on research question one, viz., *What Karanga indigenous knowledge is associated with infectious diseases?* The schedule aimed to identify the indigenous knowledge of the KHS about infectious diseases, how this knowledge is created, how it is preserved, and how this knowledge is passed down from generation to generation. The schedule was an important tool because it set in motion the entire research process of the study. The themes generated from here served as a starting point for examining indigenous knowledge about infectious diseases.

#### *4.7.4 Document analysis schedule for the Biology modules*

The development of the schedule was aimed at answering the second research question, viz., *How is indigenous knowledge of infectious diseases represented in the Biology teacher education curriculum?* and, *Why is this the case?* A schedule was created to answer this two-part research question, and the analysis hereof, focused on a number of aspects. First, the schedule focused on general information about the teacher education curriculum. This included questions like: who created this document, where and when was it created, for what audience was this document created, what type of document was created, and, what is the significance of the document. This schedule addressed among other things, the existence and emergence of infectious diseases, how they are spread, prevented and treated. In addition, the schedule was developed to identify the ideological, epistemological and pedagogical orientation of the curriculum in relation to privileged knowledge producers and the inclusion of AIKS in the Biology curriculum for pre-service teachers.

#### *4.7.5 Focus group interview schedule for pre-service teachers*

The schedule was designed to address the third research question, viz., *how can indigenous knowledge of infectious diseases be incorporated into the Biology teacher curriculum?* It was an extensive process, eliciting pre-service teachers' opinions on the benefits of including IK into their modules. Concerns related to what IK could be included, how this IK could be included, and what possible challenges could be encountered, when trying to include IK into their curriculum.

#### *4.7.6 Lesson plan analysis schedule*

The lesson plan schedule focused mainly on how pre-service teachers can plan a lesson that incorporates IK of infectious diseases into their Biology lessons to answer the following

research question in part: *How can indigenous knowledge of infectious diseases be incorporated into the Biology teacher curriculum?*

The main part of the lesson plan evaluation schedule focused on identifying the content and teaching methods used in teaching IK, related to infectious diseases. This was necessary to identify indigenous pedagogical skills that could be used in their modules. The schedule also evaluated the nature of the crosscutting themes to examine how comprehensive and integrative they are, thus promoting pedagogical and epistemic pluralism in the Biology curriculum for pre-service teachers. In addition, the lesson plan schedule sought to establish how IK relates to emerging infectious diseases such as COVID-19.

#### *4.7.7 Data generation and capacity building*

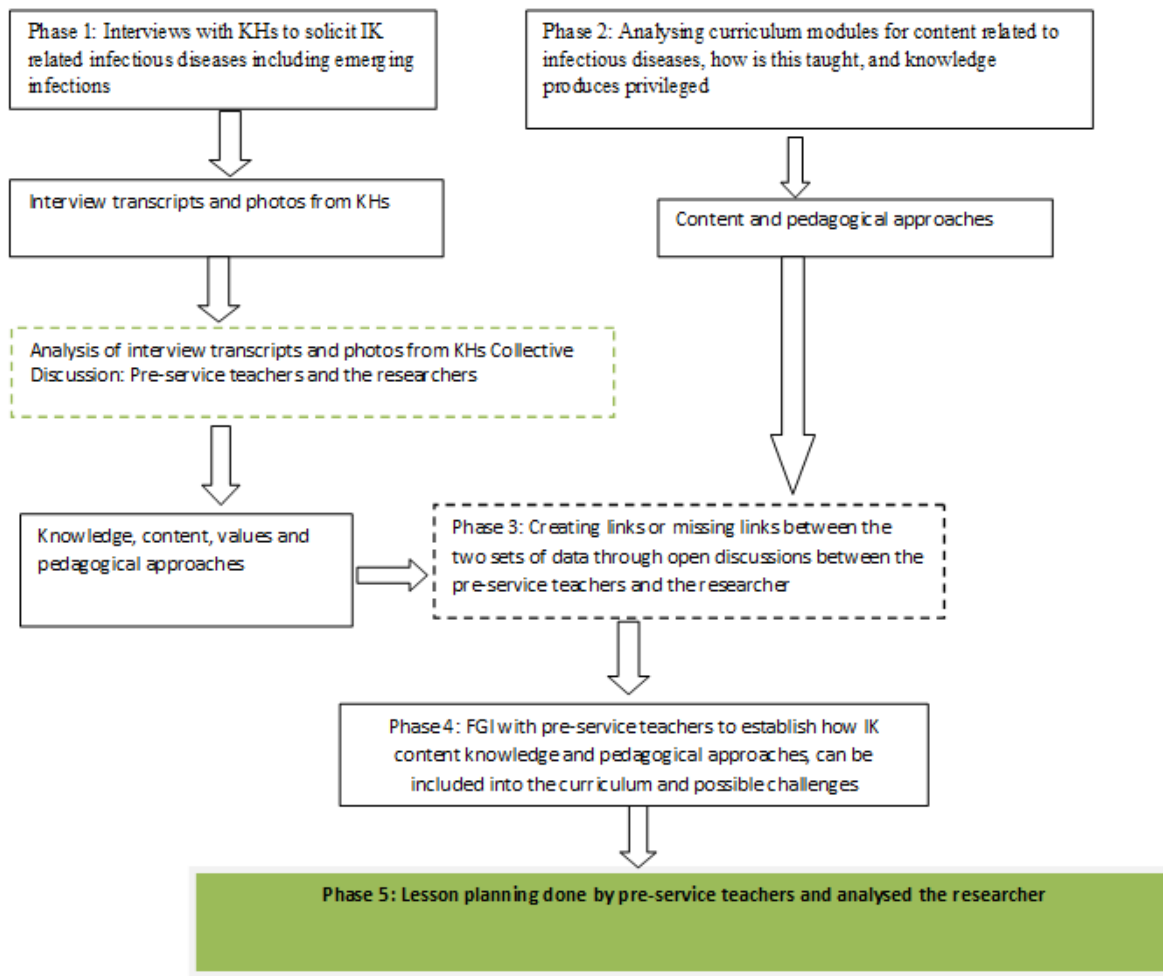
The current study is located within the qualitative research design. This design allows for different instruments to be used to generate data. In this study, semi-structured interview schedules [(to generate data from Karanga healers (KH)), two document analysis schedules (one used for the analysis of the four Biology modules for pre-service teachers and the other, used for the analysis of the lesson plans produced by the pre-service teachers), and focus group interview schedule (to generate data from FGIs with pre-service teachers) were used. Prior to data generation the pre-service teachers were trained on critical discourse analysis of content.

#### *4.7.8 Data generation process*

In this study I used a self-generated, four phased approach as shown on the following scheme (see Fig 4.2)

### **Figure 4.2**

*Data generation process*



### **Phase 1: Semi-structured interviews and the presentation of photos from the Karanga healers or taken by myself**

In this study I interviewed ten KHs. Semi-structured interviews were conducted, which included both telephonic and face-to-face contacts. Semi-structured interviews allowed for multiple ordered questions, where the interviewer had the freedom to change the order of questions and to occasionally clarify them by changing the wording or adding more questions for further elaboration (Annum, 2015). This allowed for flexibility and facilitated a thorough understanding of the responses. Therefore, this approach was appropriate for gaining a comprehensive understanding of the methods used by KHs in dealing with infectious diseases.

Telephonic interviews were done during the COVID-19 restriction period and a total of five KHs were interviewed. In addition, Doody and Noonan (2013) argued that the use of telephonic interviews prevents the researcher from interfering with participants' daily routines. Rather, participants are interviewed conveniently from a location of their choice, without disrupting their work schedules (Oltman, 2016). These interviews were conducted using WhatsApp. All the responses and photos shared were recorded telephonically.

The other five KHs were interviewed directly because the COVID-19 restrictions had been lifted. In qualitative research face-to-face interviews are considered the gold standard for collecting qualitative data (Oltmann, 2016). Perceived benefits include the ability to collect detailed data, which allows for a deeper understanding of the concepts under study, and the ability to read body language and facial expressions, which can result in a deeper understanding (Fowler, 2014; Schnell, 2012).

I audio recorded interview sessions, and KHs took me into the bush to show me some of the medicinal plants they use for managing infections. Here, I had the opportunity to take photos of these medicinal plants

## **Phase 2: Document analysis of the Biology modules collectively done by pre-service teachers and myself**

Wach (2013) described document analysis as a process of methodically dissecting compiled records to gain a deeper understanding of the content. Bowen (2017) and Owen (2014) confirmed that document analysis is used to inspire meaning, increase understanding, and create accurate information. Document analysis was appropriate because it is considered "productive, easy to obtain reports, established in the absence of bias as there is no component of reactivity and prominence as the information is consistent" (Owen, 2014, p.12). Prior (cited in Owen, 2014) suggested that policy documents identify an organisation.

Thus, curriculum documents reflect both the operations of a university and its aspirations, which are linked to national aspirations outlined in constitutional documents. This necessitated the selection of four Biology modules for pre-service teachers.

#### *4.7.9 Exposing pre-service teachers to principles of document analysis*

In order to provide pre-service teachers with the skills necessary to conduct document analyses, they were first trained in the principles of such analysis. “Document analysis is a systematic process for assessing or evaluating documents, including printed and electronic (computer-based and Internet-transmitted) material”, according to Bowen (2017, p. 2).

According to Corbin and Strauss (2008), document analysis is done to elicit meaning, gain comprehension, and create empirical knowledge. Finding, choosing, assessing (making meaning of), and synthesizing data from documents are all parts of the analytical process. Excerpts, quotations, or complete sections are obtained via document analysis and are then organized into primary themes, categories, and case examples, primarily through content analysis (Labuschagne, 2003).

In this study document analysis was done by pre-service teachers and myself. Firstly, I conducted the training of pre-service using a discursive approach. I led the discussion group only as a stimulus to engagement. First, I explained the importance of the research and posed the research question one to be answered by analysing the ordinary level Biology syllabus. This led to an in-depth discussion that explored the connection between the research question and the research objectives.

Although the pre-service teachers who participated in this study had already studied lesson planning and implemented these plans during teaching practice, it was necessary to train them on how to plan a lesson which included IK at university level because they had not learned this previously. The lesson plans were prepared to be used during pre-service teachers’

lectures by their lecturers. However, this study only ended on planning because the lesson plans were not used for teaching.

Lesson planning was taught using the basic planning criteria. These include: selecting the topic, formulating lesson objectives, establishing cross-cutting themes, devising appropriate teaching and learning strategies, selecting or generating resources, establishing a time frame, establishing chronological transition stages from introduction to conclusion, and determining the assessment criteria. PSTs were engaged in selecting an IK-related topic, finding concepts in the curriculum which could be linked to IK or taught in parallel with IK, and in establishing objectives and methods. However, because we learned from George (cited in Jacobs, 2015) and Trinos and Mudaly (2018) that some IK and Euro-Western concepts cannot be explained from a common understanding, the lesson planning training also focused on respecting each of the two knowledge systems. Where a common link between IK and Euro-Western schools of thought cannot be established, these can be taught independently, by exploring phenomena from different perspectives.

The pre-service teachers and I conducted document analysis of the four Biology modules for pre-service teachers. The analyses of the bacteriology, immunology, virology, and parasitology modules were conducted in different sessions. I facilitated the process by asking thought-provoking questions (aligned with the analysis schedule) directed to the five pre-service teachers. The sessions were audio recorded, which was helpful in creating the discussion transcripts.

#### *4.7.10 Familiarising of pre-service teachers with indigenous knowledge*

In order to proceed to the next level of data collection, the pre-service teachers were provided with interview transcripts generated from the interviews with KHs healers. This was done to ensure that pre-service teachers were familiar with IK of disease management from the

Karanga perspective. I engaged them through WhatsApp chats asking them to highlight/state any areas they wanted clarity on. Afterward, the pre-service teachers indicated that they were now familiar with the some IK on disease management. This led to the next phase of data generation which involved FGIs with pre-service teachers.

### **Phase 3: Focus group interviews with pre-service teachers**

Denzin and Lincoln (2017), Nyumba et al. (2018), and Rodriguez et al. (2011) asserted that focus groups are informed by collective dialogue of the people involved. In this study, five pre-service Biology teachers and I formed the focus group. The reason for using focus group interviews was to allow participants to share their collective insights in a natural setting. In this way, a shared perspective and wisdom is gained from all participants (Bolderston, 2012).

In order to answer all the questions on the FGI schedule, I arranged the following sessions:

#### **Session 1**

The first FGI session addressed the question: *Do you think it is a good idea to include indigenous knowledge of infectious diseases in the Biology curriculum for pre-service teachers? Explain the benefits, if any.* This session was done telephonically (through WhatsApp), and responses were audio recorded.

#### **Session 2**

This session sought to address the question: *Can you provide examples of content knowledge and pedagogical aspects from an indigenous perspective, that you think can be included in the Biology curriculum for pre-service teachers?* This session was done on a WhatsApp conference call and was audio recorded by me.

#### **Session 3**

The third FGI session addressed the following question: *What are the best approaches for integrating IK of disease management into the current Biology curriculum? Please elaborate.* This session was done in a physical setting where I located a venue at the pre-service teachers' university. We used the university grounds as the interview site and all the proceedings were audio recorded.

#### **Session 4**

The fourth and final FGI session addressed the question: *What challenges do you see in trying to incorporate IK of infectious diseases into the Biology curriculum?* This was done face to face because the COVID-19 restrictions were relaxed. Again we used the university venue.

After the final session, I transcribed all of the data and shared it with the pre-service teachers to check for accuracy.

#### **Phase 4: Pre-service teachers prepared lesson plans**

Pre-service teachers produced three lessons plans based on what IK could be incorporated into their modules, how to include it, what integration methods were suitable, and how they could be assessed. Finally, I analysed the three lesson plans guided by the lesson plan schedule.

##### *4.7.11 Data capturing and cleaning*

In this study I was responsible for data generation, capturing and transcription of the interview content. During the telephonic interviews, I captured data primarily through audio recordings, but also took some notes with pen and paper in order to have a reflective record. I kept a record of the photographs that were shared by the Karanga healers. During the face-to-face interviews, audio recordings were used along with the pen and paper method. In

addition, I had the opportunity to take images of shared photos on WhatsApp, mainly of medicinal plants and indigenous fruits. I was also the transcriber, converting all raw interview data into interview transcripts. These transcripts were shared with the KHs before they were analysed. This helped me to obtain the most representative data possible and to remove all unnecessary data. I also generated data through focus group interviews with the PSTs. The interviews were audio recorded and I later on transcribed them. All the transcripts were shared and discussed with the PSTs and they were cross checked for accuracy.

#### **4.8 Data analysis**

At the centre of qualitative research, data analysis can be done through: content analysis, the use of frameworks or matrices such as a framework approach and thematic analysis, interpretative approaches that include interpretative phenomenological analysis, grounded theory, sociolinguistic approaches such as discourse analysis and, conversation analysis (Hammersley, 2003). Data analysis is an interactive and iterative process that aims to provide an illuminating description (clarifying meaning) and create for the networking of concepts in phenomena (Harding & Whitehead, 2013). The ultimate goal is to bring out meaning from emerging data. Indeed, the principles of thematic analysis of how to code data, to search for and refine themes, and to report findings, are applicable to several other qualitative methods (Watling & Lingard, 2012).

For the purposes of this study, thematic analysis guided the analytic framework (Caulfield, 2021; Kiger & Varpio, 2020; Nowell et al., 2017; Tümen-Akyıldız & Ahmed, 2021).

Thematic analysis involves a number of steps:

- data organisation (transcribing the data, translating the data, cleaning the data, structuring and incorporating),
- coding framework (guided by the available exploratory data),

- coding the data, and
- categorising the data by identifying recurring themes

This study adopted Braun and Clarke's (2006) six stage analytical plan as outlined below:

### **Stage 1**

**Familiarising with data**, which according to Kiger and Varpio (2020) and Braun and Clarke (2006) involves the repeated and active reading through of the data. In this study data was generated from individual, semi-structured interviews with KHs, document analysis of both, the Biology modules for pre-service teachers and lesson plans, photos, and FGIs with pre-service teachers. These are common sources of data in qualitative analysis methods (Kiger & Varpio, 2020; Nowell et al., 2017). In this study I familiarised with the data through repeated listening to the interview audios and going through the interviews transcripts several times.

### **Stage 2**

**Generating codes**, this is the most important step in analysis which brings well defined and demarcated codes. The coding process is logical and is informed by the researcher generating coding template [that guides the coding process by outlining and defining the codes to be applied] (Nowell et al., 2017). The coding framework can be inductive, i.e. reflective of pertinent issues raised by the data alone, or deductive, meaning guided by specific theories or theoretical frameworks (Braun & Clarke 2006). In this study I began the process of developing codes creating an audit trail to support the trustworthiness of my interpretations and analyses.

### **Stage 3**

**Searching for themes** involves examination of the coded and collated data extracts, to identify potential themes of significance (Braun & Clarke, 2006). Theming refers to the

drawing together of codes from transcripts, to present the findings of qualitative research in a coherent and meaningful way (Sutton & Austin, 2015). In this case the process was done manually.

#### **Stage 4**

**Reviewing themes** is a process that involves the checking of codes in each theme for accuracy of placement. That is ensuring that each theme is supported by enough research data, that themes have commonality and coherence, and data between themes should not overlap (Braun & Clarke, 2006). In this study I followed these steps and revised the themes, modifying them to make sure that they were reflective of research data. Throughout this process, I kept notes that I constantly referred to for making connections from emerging data, and to create an audit trail for bolstering trustworthiness of the research findings (Nowell et al., 2017).

In the current study the analytic process involved re-reading and revising codes and themes continuously. However, Braun and Clarke (2006) recommended that this iterative analysis process stops, once all data items that appear relevant to the study question have been incorporated into the coding scheme, once themes are coherent, and additional refinements are not yielding substantial changes.

#### **Stage 5**

**Defining and naming themes** involves extracting the narrative descriptions of emerging themes relative to the research questions (Braun & Clarke, 2006). In this study I reviewed themes worthy for inclusion into the final report by selecting those which were concise yet adequately descriptive of research data (Braun & Clarke, 2006). After this I created a coherent narrative of how and why the coded data within each theme provides unique

insights, contributes to the overall understanding of research questions, and interacts with other themes (Braun & Clarke, 2006).

### **Stage 6**

**Reporting** is the stage when I presented the final analysis and description of findings (Braun & Clarke, 2006).

Overall, for qualitative research, meaning must be the end goal. Therefore, I also leaned on (Creswell & Creswell, 2018) and organised the data to develop codes and themes. Creswell (2013) suggested an orderly approach to data analysis that begins with gathering the data to be analysed, organising that data into emergent themes, and finally presenting that data in different ways. These steps were followed in this study until the final report was produced.

## **4.9 Trustworthiness**

Trustworthiness of research findings depends on the methodological approach. This is referred to as rigor of the study. Denzin and Lincoln (2017) and Maher et al. (2018) identified dependability, credibility, confirmability and transferability as necessary for measuring the trustworthiness of a study. In addition Raynes et al. (2014) proposed reflexivity as another entity that promotes the positive perception of the reader of any study.

### *4.9.1 Credibility*

According to Maher et al. (2018) credibility refers to whether the conclusions of the research can be believed or relied upon.

To prevent any deviations from obtaining credible research findings, I used iterative questioning during interviews (Shenton, 2004). During the course of the interviews the researcher could use probes to elicit detail and could revert to previously raised issues, in

order to gain a deeper insight of the phenomenon under scrutiny, and to make connections on what might be related or unrelated views from the participants.

I read widely the works of Chilisa (2012), Kaya (2013), Le Grange (2016; 2018), Mudaly (2018), Odora-Hoppers (2001), Shizha (2010; 2012; 2013), and Smith (2012), among others, on decolonisation. This enlightened me on the appropriate and acceptable designs, approaches and methodologies to apply during my study.

#### *4.9.2 Confirmability*

Auditing is another measure that was used to enhance confirmability. In this study, I gave the participants their analysed interview transcripts so they could verify that the conclusions drawn were accurate. I corroborated auditing with audit trails that outlined a step-by-step scheme in both data generation and analysis (Shenton, 2004). I used audit trails to develop reflective commentaries, on which weaknesses of the study were identified and acknowledged, thus enhancing confirmability.

#### *4.9.3 Dependability*

According to Denzin and Lincoln (2017) and Forero et al. (2018) dependability is a scenario in which two researchers are expected to draw the same conclusions from the same research when they use the same research method. Shenton (2004) proposed that dependability can be achieved by setting up an acceptable research design and implementing it, having detailed data generation processes, and performing reflective appraisals of the whole study process. In this study, I provided thick descriptions of the data generation process and used field notes to appraise the research process.

#### *4.9.4 Reflexivity*

In any research, the researcher enters the field with preconceived notions, alternative theoretical perspectives, methodological positions, and ontological orientations (Haynes, 2012; Braun & Clarke, 2019). However, in qualitative research, the researcher is in a flexible position where new insights can be incorporated, resulting in an insightful revision of the methodological process that focuses on methods of data collection, ethical issues, and power relations (Dodgson, 2019; Haynes, 2012). Therefore, reflexivity simply refers to “an understanding of the researcher's role in the research process and thus focuses on promoting a healthy relationship between knowledge production (epistemology), the process of knowledge generation (methodology), and the researcher's position and participation (ontology)” (Haynes, 2012, p. 2).

In this study, reflexivity was fostered by considering Dodgson's (2019) processes. These included densely describing the contextual setting of the study, triggering contextual intersections where different settings contributed equally to the research process and findings, timing all activities, considering my possible researcher bias due to my upbringing as a Karanga descendant, and creating good conversational spaces with participants. In addition, reflexivity was fostered by recording all procedural notes at all stages, including the research proposal, application for ethical clearance, participant selection, data collection process, analysis, and data reporting (Braun & Clarke, 2022; 2019; McCaffrey & Edwards, 2015; Shelton & Flint, 2019; Wilkinson, 2015).

#### **4.10 Ethical considerations**

Ethics refers to the system of moral principles by which people judge their actions as right or wrong, bad or good. Social researchers are expected to conduct their research in an ethical manner, since research of any kind takes place in a social context (Creswell & Creswell,

2018). This justifies the moral perspective adopted by taking into account the moral and legal implications and the limitations on the topics of inquiry (Suri, 2020). Ethical considerations were addressed as follows:

#### *4.10.1 Medical ethics, efficacy, and safety*

Many herbs used by KHs have not been bio-medically tested for efficacy and safety. Therefore, care should be taken when selecting herbs for the Biology module to avoid including some which might be potentially poisonous. For ethical and safety reasons, only medicinal plants that were cultivated in the herbarium of Harare Botanical Gardens in Zimbabwe, were considered in this study. However, it should be noted that most of the plants cultivated were not initially exposed to biomedical tests for medicinal uses. Any medicinal plants identified by the KHs but not found in the medicinal plant database, were excluded from consideration. This however, should not be taken to mean that IK of the KHs is subaltern and can only be valued when confirmed by the Euro-Western technologies. This decision was made to ensure that pre-service teachers could include plants which were endorsed as being safe for use by people. Safety of indigenous medicinal plants is hotly debated in Zimbabwe, and if pre-service teachers do incorporate the teaching about these indigenous plants when they become practicing teachers, I deemed it crucial that they do so with confidence, although this meant defaulting to Western standards of safety. Ultimately, the pre-service teachers and I focused on the inclusion of IK as the most important part of this work, even if this meant using Western barometers to determine safe consumption. We do not deny our angst in making decisions based on Western standards, especially in a study which seeks to decentre the ubiquity of Western ideas.

#### *4.10.2 Gatekeeper permission*

Johnny (2019, p. 1) described gatekeepers as “essential mediators for accessing study settings and participants within social research. They may be persons within organisations who have the power to grant or withhold access to people or situations during research into organisations”. In the current study, through the Office of the Registrar at Midlands State University (MSU), I obtained permission to conduct the study at this institution. Permission was also obtained from chief Chingoma to access KHs in the community. Ethical approval (Appendix A) was obtained from the University of KwaZulu-Natal, where I was registered as a student. These approvals ensured that the data generation was conducted by adhering to ethical requirements prescribed by gatekeepers.

#### *4.10.3 Informed consent and voluntary participation*

Informed consent which clearly states that participants can request withdrawal from the study at any time, is a crucial ethical requirement (Gray, 2013). Written informed consent was obtained from each pre-service Biology teacher and from each KH in my study.

Participants were informed at the beginning of the study that participation was voluntary.

Data generation was guided by ethical principles that focused on, among other things, avoiding harm to participants, avoiding misrepresentation, avoiding deception/fidelity/breach of confidentiality, respecting participants' privacy, avoiding stress and discomfort, avoiding inappropriate intrusion, and promoting confidentiality of the data which is generated.

It is important to note that permission was sought and granted, to record interviews, to use images as well as to include the findings obtained in this report and at other fora for dissemination of findings.

#### *4.10.4 Anonymity*

Pseudonyms ensure anonymity, and confidentiality of the participants' feedback (Allen, 2017; Kaiser, 2009; Saunders et al., 2015). Pseudonyms were used for all participants in this study. Furthermore, the use of pseudonyms allowed for a high level of participation and openness during data generation.

#### *4.10.5 Confidentiality*

Research ethics require that participants be protected from any form of disclosure of their identity. There are many ways in which participants can be protected from a breach of confidentiality. In this study, confidentiality was promoted by revising the informed consent form by not including any form of identity in the study report, by following University of Kwa-Zulu Natal ethical approval guidelines, and by adhering to the conditions stipulated by the gatekeepers, cleaning the data to remove any form of identity, informing participants that their contributions would only be used for research purposes, and assuring participants that any form of data storage would be kept under lock and key until destroyed (Kaiser, 2009). In this study all the participants requested not to have their names used in the final report. All responses were reported as opinions of members of a sample, and not linked to specific individuals.

### **4.11 Data use, storage and disposal**

The following conditions were highlighted in this study. Data would be stored for a minimum period of five years in a secure place approved by my research supervisor. All transcripts and photographs would be destroyed in a shredding facility after five years. Audio recordings would be deleted after five years. Gie and Beyers (2014) outlined that retention period of data differs with regulatory authority. Some authorities may permit the disposal of data as

soon as the study is over, while some authorities give specific retention periods. In this case I was guided by the University of Kwa-Zulu Natal's ethical agreement that for doctoral studies the data should be retained for at least five years and then safely disposed.

#### **4.12 Limitations of the study**

Limitations are factors that may obstruct the research process. However, limitations are not a scapegoat for not conducting a credible and realistic study, but must be used as an opportunity to work around the challenges in the current study or in future studies. The following section provides a detailed description of the limitations of the current study

This study was limited in several ways. First, it was difficult to obtain research data from KHS that have a knowledge niche to protect. KHS were not eager to share data and especially knowledge about their healing practices. Moreover, the healing knowledge of the KHS is considered a spiritual gift and therefore cannot be shared with others. They believe that if spiritual healers share their knowledge without the consent of their ancestors, the healing powers might dwindle. To overcome this problem, I established trust by assuring them of the use of their data, anonymity and confidentiality. As the principal researcher of Karanga descent, I interacted with community members, gained their trust and convinced them of the value of their knowledge as part of the mainstream curriculum. Only those KHS who were convinced about the benefits of the study, and who they obtained consent from their ancestors, were part of the sample.

The study was conducted within two heterogeneous institutions whose practices need to be harmonised, which would have been a major challenge in determining the most important aspects to consider in this study. In order to decide on what could be harmonised within the teacher education curriculum, I read extensively the works dealing with decolonisation and

indigenisation of curricula by Le Grange (2016), Chilisa (2012), Hauser et al., (2009) and Shizha (2014) to build this knowledge base.

#### **4.13 Exiting the field**

Respectful approaches to accessing and exiting the field of study, are part of the fieldwork (Satirenjit & Sumathi, 2010). In this case I maintained close and continued contact with all participants after leaving the field of study. Through telephonic engagements I shared research findings from transcribed data, to the summary of the findings with KHs, pre-service teachers and the chief.

#### **4.14 Chapter summary**

This chapter covered the study's critical research paradigm, qualitative nature, setting, sample that was selected, and sample characteristics. The methods for generating data, such as focus groups, semi-structured, one-on-one interviews, and document analysis, were covered in the chapter. I also covered the ethical issues that influenced my study in the chapter. In the chapter, data use, storage, and disposal were described. The chapter explained the study's limitations. In the chapters that follow, the data analysis will be used to address the three research questions that served as the study's driving principles. Findings pertaining to research question one are presented in the next chapter.

## CHAPTER 5

### FINDINGS ON RESEARCH QUESTION ONE

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## 5.1 Introduction

In this chapter I present, analyse and discuss findings related to the first research objective, which aimed to identify indigenous knowledge (IK) related to infectious diseases. First, participant demographics are presented. Second, IK related to infectious diseases as reported by Karanga healers (KHs) is described under the following subsections: causes, transmission, and diagnosis of infections. The chapter also discuss how IK is generated, preserved (retained), and transmitted among community members and between generations. Third, a comprehensive description of the methods used by KHs to treat infections, is provided. These include herbal remedies, the use of indigenous foods, behavioural strategies, and good health practices. Findings are based on data which was generated using different methods in an integrated way, to enhance rigour.

## 5.2 Karanga healers' demographic data

Demographic data is important in qualitative research because it is used to determine how representative participants are, of the general community of being investigated (Hammer, 2011). In this study, demographic data was collected from the ten KHs (who were the participants engaged to explore research question one: *What Karanga indigenous knowledge is associated with infectious diseases?*) Demographic data was organised by the following categories: gender (where male is represented by M and female by F), education level, years in practice, source of healing power, and language spoken. This information is presented in the following Table 5.1:

Table 5.1

*Participants' Social Demographic Data*

	KH1	KH2	KH3	KH4	KH5	KH6	KH7	KH8	KH9	KH10
Gender	M	F	M	F	F	M	F	M	F	F
Age	62	60	54	66	63	42	57	82	45	80
Formal Education at highest level	Primary school	Secondary school	Secondary school	No schooling	Primary school	Secondary School	No schooling	Primary school	Secondary school	Primary school
Years of practicing as KH	30	36	38	47	47	18	40	50	23	60
Source of healing knowledge	Spiritual	Spiritual	Training	Spiritual	Training	Training	Spiritual	Spiritual	Spiritual	Spiritual
Language (s) spoken	Chishona	Chishona	Chishona	Chishona	Chishona	Chishona	Chishona	Chishona IsiNdebele	Chishona	Chishona IsiNdebele

Ten KHs were interviewed, of which six were female and four were male. This gender distribution was random because I used the recruitment strategy which was based on referral by the chief, who had more information about KHs, whose services were in high demand in his community. All participants were 40 years and older and had been working as healers for many years. This age distribution and the length of time they had been practising, as well as anecdotal evidence based on conversations with the chief, indicate that the participants were very experienced and therefore could be relied upon as credible sources of knowledge, for treating infectious diseases in the Karanga population. All KHs emphasised that their healing powers were in no way related to formal education. Karanga healing knowledge is acquired either through learning or spiritual possession. Spiritual possession has been defined as "a spectrum of experiences in which the person involved negotiates with or is overcome by a force such as an ancestor, deity, or spirit that uses the human body as a vehicle to communicate with human communities" (Encyclopedia of Religion, 2022, p.1). This definition suggests that the KHs possessed metaphysical powers of perception to serve as mediums of communication between the living dead and the community or family members. The living dead refers to the deceased ancestors who are believed to continuously provide guidance to the living. The role of the spiritually or ancestor-possessed is supported by the data, in Table 5.1, according to which seven of the KHs gained their knowledge and healing powers through spiritual possession, while three obtained their healing knowledge through training in traditional schools.

Healing powers through spiritual possession are a common practice in many African communities (Mokgobi, 2014). On the other hand, training to acquire healing knowledge and powers occurs by serving as an assistant to an already established healer, assisting in the acquisition of healing knowledge, or receiving instruction from community elders or practising traditional healers (Nompumelelo et al., 2019). Indeed, Nompumelelo et al. (2019,

p. 14) identified the most important skills taught during training as "consultation, diagnosis, holistic patient care and treatment, integrative and holistic healing, application of healing procedures and cultural rituals, spiritual development, ethical competencies, problem solving, herbalism, ancestral knowledge, and end-of-life care". This demonstrates the significant role that both traditional healers and community elders play, in the preservation and transmission of IK (Viscogliosi, et al., 2019).

All ten KHs participated in the interviews. Five of them were interviewed by phone via WhatsApp, with the researcher sending both written and audio interview questions. The participants responded on the same platform by sending audio responses, photos, and typed messages in their choice of language which was Chishona, in which they were fluent. The other five responded during the face-to-face interviews, and in this setting, I had the benefit of observing some common herbal remedies, focusing on how herbal medicines were prepared and administered.

### **5.3 Indigenous Knowledge of infectious diseases: The Karanga healers' views**

The Karanga people are an intact group, immersed in their cultural and traditional practices. Based on my lived experience as a member of the Karanga community I am aware that their lives are a model for their culture. For example, regarding the prevalence of infectious diseases, the interviews with the KHs revealed that infections can be understood based on: (a) causes, (b) diagnosis, (c) prevention and treatment, and (d) education. I present the four themes with supporting data from the interviews with the ten KHs to address the first research question: *What Karanga indigenous knowledge is associated with infectious diseases?*

### 5.3.1 Causes of infectious diseases

The KHs attribute the outbreak of infectious diseases to many factors, especially spiritual forces such as witchcraft, disgruntled ancestral spirits, and vengeful spirits. The common understanding and belief of KHs is that the outbreak and spread of infectious diseases are linked to the spiritual and physical worlds. To deepen this understanding, the KHs shared the following in responses to the question: *How do you explain the outbreak of infectious diseases from an indigenous perspective? You may highlight the causes or origins of diseases from the indigenous position.*

Table 5.2

*Views of KHs on causes of infectious diseases*

Causes of infections	Interviewee responses
Infectious diseases and spiritual forces	<p>“When people neglect their ancestors, infectious diseases come as ancestral punishment” (KH10)</p> <p>“...sickness (infections) can be due to witchcraft” (KH7)</p> <p>“...when ancestors are angry they open doors to your enemies (witches)...” (KH2)</p> <p>“...infections, and death...might be because of avenging spirits” (KH8)</p> <p>“...ancestral spirits fight for justice... one Zimbabwean singer (Hosiah Chipanga) argued that when we pray in churches, we are doing nothing but helping white people worship their own god and neglecting our ancestral spirits” (KH3)</p> <p>“Our culture is no longer respected by the younger generation. ...” (KH9)</p>
Infectious disease and the physical world	<p>“.....wandering spirits in trees or from water bodies” (KH4)</p> <p>“Spirits that causes disease reside in air, mountains, rivers, and water bodies” (KH7)</p>

Vector spreading	<p>“...some infections can be transmitted by insect or animal bites....one gets malaria from a mosquito bite, rabies from the bite of an infected dog” (KH10)</p> <p>“...insects such as tsetse flies and houseflies can spread infections...” (KH7)</p>
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These excerpts confirm that life in general and infectious diseases in particular are better understood in indigenous African communities, within the spiritual and physical milieu. All KHs point to a shared belief and understanding that life cannot be complete without the spiritual connections. The KHs emphasised that the ancestors continue to protect the living. They asserted that if discontented due to lack of worship, ancestral spirits will inflict misfortune, which can include the outbreak of infectious diseases. This is illustrated by the quote "When people neglect their ancestors, infectious diseases come as punishment from the ancestors" (KH10). From the Karanga perspective, the outbreak of infectious diseases is also related to witchcraft. The element of witchcraft is associated with the withdrawal of spiritual protection from any form of misfortune by the ancestral spirits because of certain transgressions of the living toward the dead. These transgressions include not worshipping the dead, breaking cultural values and initiating taboos.

The KHs also associate the outbreak of infectious diseases with vengeful spirits. These are discontented ancestral spirits because they were wronged while they had been alive. Therefore, the spiritual explanation for untimely death among the KHs is always associated with punishment by the ancestors. When someone dies, the elders of the family question their connection to the spirit of the ancestors (*Mudzimumukuru*) (Ekore & Lanre-Abass, 2016; Sup & van der Merwe, 2008). This is evidenced by the statement: "...infections and death...could be caused by avenging spirits" (KH8). In the event of a death, spiritual consultations are performed and if the cause of death is believed to be related to witchcraft or caused by

someone, a vengeful spirit is summoned to fight those who bewitched or killed that person. The vengeful spirit usually fights by inflicting infections, misfortune, untold suffering, and sometimes death on the families associated with the perpetrator (Musanga, 2017). In order to put this spirit to rest, compensation (cattle accompanied by a young girl) must be paid (Musanga, 2017). The girl in this case will marry into this family or when married the bride price will be paid to the family she had been sent to.

This leads to the promotion of harmony based on the *Ubuntu* principle that people must live in peace and respect each other and the right to life. The *Ubuntu* philosophy is based on the spirit of "togetherness and collectivism" (Odari, 2020, p. 56). In this sense, what one does is not for personal gain, but for the good of the community. When injustice has occurred, the community takes responsibility to correct it and pave a way forward, for example, through some form of compensation for the offense by the perpetrators (Musanga, 2017).

The outbreak of infections, especially sent from living ancestral spirits, was also mentioned by KHs in their interviews. In this study the infections and misfortune were attributed to the Karanga turning their attention away from ancestor worship and toward Christianity. Thus discontented ancestral spirits due to the fracturing of African cultural beliefs evidenced by the migration to Christianity. According to KH3, Hosiah Chipanga (A Zimbabwean musician) argued that "when we pray in churches we are doing nothing but helping the whites to worship their own God and neglect our ancestral spirits" (KH3). Therefore, the ancestors are angry and punish the living for their negligence.

The KHs claim that the physical world can harbor evil spirits that can cause infections, misfortune or cause one to be possessed by negativity. In reality, their contributions relate to the spiritual milieu, as highlighted in the previous descriptions. The physical hosts of these evil spirits and some hosts of infectious diseases include bodies of water (pools in rivers or

streams), trees, air, and mountains. In this way, punishment from discontented ancestors who cause infections through physical hosts of evils spirits, is experienced.

In addition to the spiritual understanding of the spread of infections, the KHs also emphasise that infections can be transmitted by some insects like flies, and/or animals, as mentioned:

"....some infections can be transmitted by insect or animal bites....one gets malaria from a mosquito bite, rabies from the bite of an infected dog" (KH10). Therefore, KHs understand the vector spread of infections, which is similar to vectors of pathogens discussed in the Euro-Western health care system.

One of the concepts highlighted in some of the excerpts in Table 5.2 is Chilisa's (2012) mourning aspect, which characterises how the cultural heritage of indigenous peoples is being eroded.

### *5.3.2 Diagnosis of infections: KHs' untapped practices*

In terms of disease diagnosis, most people globally rely on laboratory tests to confirm the presence or absence of infection (Caliendo et al., 2013). This is a Euro-Western approach that has gained confidence almost everywhere in the world (Carter et al., 2012). However, during my interactions with the KHs in this study, they emphasised that infections can be diagnosed by divination, examination of physical appearance, and by questioning the patient or the patient's caregivers. To support the KHs' views, the following responses were provided to the question: *Explain how you diagnose any form of infection in people.*

*Table 5.3*

#### *KHs' views on diagnosis of infectious diseases*

Approaches for diagnosing infections	Interviewee responses
Spiritual divination	"...cast our bones to see where a disease is coming from" (KH2).

	“We ask our ancestors to tell us the cause and treatment...” (KH7).
Physical diagnosis	“...check the nature of the skin...” (KH9). “...appearance of eyes texture of the skin are used as indicators of good or bad health, especially with STIs” (KH4).
Interviewing	“In most cases we ask the patient to describe what they feel...we then use this information to identify the nature of infection and possible treatment” (KH10). “For some infections we encourage our patients to share how they feel...” (KH5).

Spiritual divination, diagnoses based on observation of the body of the patient, and diagnoses based on verbal enquiry from the patients, were key methods of diagnosing disease. Each of these diagnostic approaches is described in the following subsections.

#### ***5.3.2.1 Divination diagnosis***

The KHS believe in the existence of an underworld ruled by spirits. They explained that they not only depend on the physical world for their survival, but also receive wisdom and guidance from their ancestors (the living dead). When someone has a health problem, the patient is taken to *sangomas* or even spirit mediums, as the following excerpt shows, "We ask our ancestors to tell us the cause and the treatment..." (KH7). These people with spiritual powers make a diagnosis that gives information about what the person is suffering from. This view is supported by White (2015), who argued that from an African perspective, the causes of disease cannot be separated from the spiritual world. Therefore, KHS rely on consulting their spiritual diviners when people are ill. This narration as supported by the excerpts point to a rich collection of untapped IK amongst the KHS and the Karanga community in general.

### ***5.3.2.2 Diagnosis based on physical appearance of the patient***

The KHs examine the patient's physical appearance to identify the type of infection or disease: "...the appearance of the skin or eyes may be indicators...check the condition of the body" (KH4). In this case, KHs examine the texture of the skin, whereupon they relate this appearance to their knowledge of infections. For example, KHs can determine if someone has a sexually transmitted infection (STI) based on the texture or roughness of the skin. The KHs also emphasised that they can tell the type of infection by the appearance of the eyes. For example, if someone has the flu, their eyes are red. What they see is in turn linked to their knowledge of infections.

### ***5.3.2.3 Diagnosis through interviews***

KHs also use interviews to learn about a person's health. This is evidenced by the following excerpt, "In most cases, we ask the patient to describe how they feel...we then use this information to determine the type of infection and possible treatment" (KH10I). Most importantly, KHs have the wisdom to distinguish between a spiritually-related infection and a physically-related infection. From such interviews the patient can be told of the ailment and also be prescribed indigenous medicine.

## **5.4 Karanga healers' approaches to preventing and treating infection**

KHs shared different ways by which they prevent and treat infections. These include herbal remedies, indigenous traditional foods, quarantine, isolation, and avoid sharing of items.

These strategies were revealed as responses to the question: *Can you explain how you prevent the spread of infectious diseases and treat them in your community?*

#### *5.4.1 Herbal remedies*

The KHs have a rich collection of plants and herbs that they use both to prevent, and treat infections. Table 5.4 provides information shared by the KHs, to answer the question posed above.

Table 5.4

*Prevention and treatment of infectious diseases: KHs' perspectives*

Participant	Interviewee responses
KH6	... <i>Chifumuro (Dicoma anomala)</i> to prevent and treat infections in both the young and the old.
KH5	...prevent illness by tying a string of <i>Chifumuro (Dicoma anomala)</i> around the wrist of a new-born baby.
KH9	...marked with incisions... herbal ointments are rubbed.
KH4	When a child is born...includes herbal incisions .... We also tie a medicinal string/cord around the wrist, waist or neck which acts as a protective shield.
KH3	We use herbs like <i>Mufandichimuka (Myrothamnus flabellifolius)</i> , <i>Zumbani (Lippia javanica)</i> , <i>Muruguru (Carissa bispinosa)</i> , <i>Mubvumira (Kirkia acuminata)</i> , <i>Chifumuro</i> , <i>Mulemoni (Citrus limon)</i> , <i>Muonde (Ficus sycomorus)</i> , <i>Mususu (Terminalia sericea)</i> , <i>Musekesa (Piliostigma thonningii)</i> , <i>Mukomberwa (Crossopteryx febrifuga Benth)</i> , <i>Mutsubvu (Vitex payos)</i> and <i>Mugamutiri (Eucalyptus camaldulensis)</i> . In most cases, the part of the herb is boiled to extract the medicine. The medicine is ingested orally while it is still hot. We mainly use roots, leaves and bark.
KH10	Leaves and twigs of <i>Mufandichimuka (Myrothamnus flabellifolius)</i> .....boil them in water. The extract is drunk while hot. It is used to treat chest pain, coughs and colds. <i>Zumbani</i> leaves, are prepared in the same way as <i>Mufandichimuka (Myrothamnus flabellifolius)</i> . <i>Zumbani (Lippia javanica)</i> , leaves can also be smoked, rubbed when fresh and inhaled. Sometimes we mix <i>Zumbani (Lippia javanica)</i> , <i>Mufandichimuka (Myrothamnus flabellifolius)</i> , and <i>Mugamutiri (Eucalyptus camaldulensis)</i> leaves and then boil them.
KH8	When one is suffering from flu that affects the throat, I give them leaves of <i>Musekesa(Piliostigma thonningii)</i> which they must chew swallowing the sour juice. Also the inner bark of this tree can be chewed and ingested. The patient may continue taking this medicine, but in most cases within a day of taking the medication change for the better is noticed.

KH1	<p><i>Zumbani (Lippia javanica)</i> is one of the local herbs we use to treat many infections. For flu-related diseases we use the leaves. The patient can boil the leaves and drink the medication, smoke the dried leaves, or steam, using the boiled leaves to decongest the nasal passage. Also we take leaves of the gumtree (<i>Eucalyptus</i>), lemon leaves and guava leaves, then boil them together, the medicine made is then taken through drinking by the patient. The medicine can be kept in a bottle, then the patient warms it before taking it at any time.</p>
KH2	<p>We also use <i>Mutsubvu (Vitex payos)</i> leaves to treat flu related signs. We give dried leaves to the patient from which the patient rolls the leaves into a cigar, and smoke. Fresh leaves can also be boiled and the extract is drunk while hot as medication.</p>
KH7	<p><i>Mususu (Terminalia sericea)</i> is another common plant that we use to treat diarrheal complication and flu. We use two parts separately; the leaves and inner bark. Both the leaves and inner barks are chewed by the patient and the sour juice extract is ingested. This juice is very effective for within a day the patient may feel some changes for the better.</p>
KH6	<p>When a person is experiencing unending coughs and flu I use a milky syrup of the <i>Muonde (Ficus sycomorus)</i> tree. I take the patient to the tree where I cut the bark, from which a milky syrup comes out and ask the patient to suck it. In extreme cases where the patient cannot walk to the tree, I harvest the fresh barks and the patient will be asked to chew the bark that would be laced with a brown sticky substance formed from the clotting milky plant syrup. I also use <i>Mukomberwa (Crossopteryx febrifuga Benth)</i> barks, where I boil either freshly harvested ones or dried ones and give the medicine to a patient who is coughing, having chest problems, or having flu.</p>
KH5	<p>To stop the serious effects of flu we ask our patients to use the inner bark of the <i>Mubvumira (Kirkia acuminata)</i> tree. The patient chews the bark swallowing the juice coming from it. This treatment works best especially when the flu is at its early stages and mild. But when the infection becomes serious I use <i>Mufandichimuka (Myrothamnus flabellifolius)</i>. I boil either the twig part or grass part and then give the warm extracts to my patients.</p>

The KHs shared names and pictures of the various plants and herbs they use to prevent and treat infectious diseases. Figures 5.1 and 5.3 to 5.12 represent pictures of herbs that the KHs use to treat and prevent infectious diseases while Figure 5.2 shows the medicinal properties of alkaloids. However, researchers have used western science to isolate the active ingredients of these herbs and used them to treat influenza. A detailed description of the pharmacological use of each herb/plant can be found after the picture of each plant/herb.

### Figure 5.1

*Musekesa (Piliostigma thonningii)* (Source: KH4)



During face to face interviews with KHs, I learnt that this plant is used by the KHs to treat flu symptoms, especially upper respiratory tract infections. The KHs use the leaves and barks separately. The raw leaves are given to patients with flu-like symptoms, especially those of the throat. The patient is asked to chew these leaves and swallow the juice, which will lead to healing of the infection (KH8). Although the KHs have confidence in the healing potential of

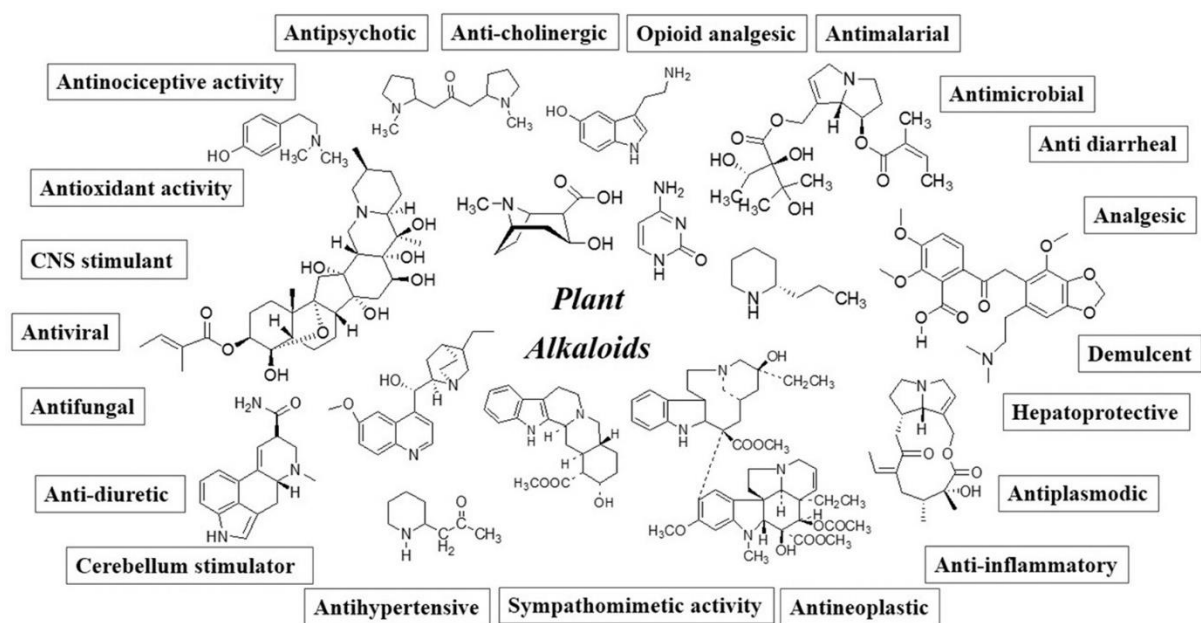
the sap obtained from this tree, they encourage patients to take the medicine until recovery.

The recovery period in this case is based on the next assessment of the patient by the healer, which is somewhat different from Euro-Western clinical approaches that require laboratory tests to confirm that one has been cured of an infection.

From a scientific point of view, pharmacological analysis has proven that this plant (in Figure 5.1) contains alkaloids, flavonoids and tannins that have antibacterial (Paiva, et al., 2010), antimicrobial and antioxidant effects (Ighodaro et al., 2012). Naturally occurring alkaloids are found in plants, where they are involved in plant defence mechanisms, among other factors (ALi et al., 2019). The medicinal properties of alkaloids are shown in the following figure:

**Figure 5.2**

*Medicinal Functions of Alkaloids* (extracted from Debnath et al., 2018)



Close analysis shows that these beneficial properties, such as antiviral, antifungal, antioxidant, anti-inflammatory, and anti-diuretic, are particularly encouraging should a new coronavirus outbreak occur. In addition, the presence of antiviral substances is an indication of the usefulness of this plant in fighting viral infections such as influenza, and the IK practice, where the extract of the plant is used to treat flu-like infections, is complemented by scientific evidence.

Flavonoids are another group of chemicals present in the extracts of this plant. These compounds are mainly found in fruits, leaves and vegetables (Calado, et al., 2015). They are rich in antioxidants, have antibacterial, antiviral, anti-inflammatory and anti-cancer properties (Tiwari & Husain, 2017).

Another group of chemicals contained in this plant are tannins. These compounds are associated with health benefits such as antioxidant, anti-carcinogenic, anti-allergic, anti-inflammatory, anti-helminthic (anti-parasitic), and antimicrobial activities (Sharma et al., 2019). From a scientific point of view, the extracts of this plant have been shown to be effective in the treatment of cough and persistent menstrual flow (Sharma et al., 2019). The use of the extracts of this plant for the treatment of cough is encouraging, considering that the KHS also use the same plant for the treatment of flu-like conditions.

### **Figure 5.3**

*Mutsubvu (Vitex payos)* (Source: KH5)



*Mutsubvu (Vitex payos)* is another tree used by the KHS to treat coughs. The KHS use the leaves to prepare the medicinal portions. There are two methods to prepare the medicines from this plant:

1. The leaves can be collected, dried and rolled into cigars to be smoked by the patients.
2. The leaves are boiled and the patient drinks this extract orally. The extracts of this tree have been found to be effective in treating cough (Maroyi, 2012). In addition, from a health perspective, this plant is a good source of larvicidal agents which are used to prevent transmission by vectors (Nyamoita, 2011).

**Figure 5.4**

*Zumbani (Lippia javanica)* (Source: KH8)



*Lippia javanica* (Zumbani) is another herb mentioned by the KHs. This herb is used to suppress both cough and flu-like symptoms. The KHs use the leaves of this herb to prepare medicinal extracts, which are then administered to patients with symptoms of flu-like conditions. They explained that the leaves are boiled and the extract is taken orally while it is still hot, until the patient recovers. The herb can also be administered by steaming the patient's body. In this case, the boiled extract is placed in a small bucket and the patient covers his or her body with a blanket over the steaming medicine. The patient is encouraged to inhale the steam and heat up the whole body until sweating. In addition, the leaves can be dried and crushed, from which *Lippia javanica* cigars are made, which the patient can smoke to treat the infections.

In pharmacy, *Lippia javanica* extracts have been shown to have antimicrobial activity (Maroyi, 2017). The microbial activities are of great importance in clinical health as they can be used to control pathogenic micro-organisms. While indigenous medicinal information about the herb was shared by KHs, a literature search revealed that this herb is used in the Euro-Western health system to treat cough and cold (Kumar et al., 2011). Although the

allopathic and indigenous health systems are rooted in different philosophical frameworks, such an association through which the mainstream health system and the indigenous health system share a common understanding of the benefits of *Lippia javanica* in the treatment of cough and flu-like symptoms is useful, and shows that IKS offer medicines which are similar to some of those used in modern westernised health systems, hence challenging the marginalisation of IK based on the notion that it is unscientific (Shizha, 2010).

### Figure 5.5

*Mugamutiri (Eucalyptus camaldulensis)* (Source: KH7)



*Mugamutiri (Eucalyptus camaldulensis)* is another tree mentioned by the KHs. The KHs use the leaves of this plant to make cough syrup, which is then administered orally. The cough syrup is prepared by boiling a mixture of the leaves of this plant together with *Citrus limon (mulemon)* and guava leaves. From a pharmacological point of view, extracts of *Eucalyptus camaldulensis* have anti-proliferative (Maroyi, 2017) and anti-microbial activities (Babayi et al., 2004).

The leaves of the plant have been shown to be used medicinally, e.g., to treat sore throat (Maroyi, 2017), cough, flu, and fever when prepared with leaves of *Citrus limon* and *Psidium guajava* (Maroyi, 2012). The scientifically reported medicinal uses of these plants, clearly

show that they can be used to manage infections. As proven the KHs use the plants but they remain an underutilised resource which need to be tapped into.

**Figure 5.6**

*Mususu (Terminalia sericea)* (Source: KH5)



The KHs described the use of the leaves of *Mususu* (*Terminalia sericea*) and the inner bark as a remedy for cough and sometimes for stomach pain. Patients are asked to chew either the bark or the leaves of this plant to get rid of upper respiratory tract infections and stomach ailments.

From a pharmacological point of view, *Terminalia sericea* contains antioxidant, anti-parasitic, antifungal, antibacterial, antiviral, anti-inflammatory, antidiabetic, lipolytic, anticancer, anti-mutagenic and anti-neurodegenerative activities (Ali et al., 2008; Manase et al., 2012; Zonyane et al., 2012). The plant is of great importance in the pharmacological industry to control parasitic infections and to prevent viral infections (Nkoana et al., 2016; Singh et al., 2021). Anti-inflammatory agents are important for treating pain caused by slow tissue damage (Oguntibeju, 2018), antidiabetic agents are used to reduce the risk of diabetes (Gupta et al., 2017), lipolytic agents are used to reduce body fat (Li et al., 2020), anti-mutagenic agents are used to inactivate mutagenic DNA (Bouguellid et al., 2020), and anti-neurodegenerative agents are plant extracts used to "prevent neuronal diseases that affect the components of the brain by gradually degenerating the structure and function of the central or peripheral nervous system" (Ayeni et al., 2022, p.1). Maroyi (2012) reports that extracts of *Terminalia sericea* are used clinically to treat cough, diarrhoea, and stomach pain. This complements the contributions of KHs, where the leaves and inner bark of the plant are used to treat flu-like infections and diarrhoea.

### **Figure 5.7**

*Muonde* (*Ficus sycomorus*) (Source: KH5)



Another tree valued by the KHs was Muonde (*Ficus sycomorus*). The KHs emphasised that the white sap that oozes from the stem is used in the treatment of congested respiratory tubes and infected lungs. The KHs emphasised that in most cases they do not remove any part of the plant to prepare the medication, but advise the patient to suck the milky syrup that comes out of the severed plant tissue and swallow it as part of the medicinal treatment.

In the pharmacological industry, extracts of *Ficus sycomorus* have been shown to contain antibacterial compounds (Olusesan et al., 2010), alkaloids, saponins, and tannins (Sandabe et al., 2006). Saponins are naturally occurring compounds commonly found in the cells of legumes (Shi et al., 2004). These compounds lower blood lipids, reduce cancer risk, and lower blood sugar response levels (Shi et al., 2004). They are also associated with the prevention of dental caries and are an antidote for acute lead poisoning (Shi et al., 2004). Elsewhere, extracts of *Ficus sycomorus* are used to treat cough (Maroyi, 2012), TB, colds, and chest discomfort (Mabogo, 1990).

**Figure 5.8**

*Mubvumira (Kirkia acuminata)*(Source: KH5)



*Mubvumira (Kirkia acuminata)* is another tree whose components are used by the KHs to treat infections. The KHs stated that the inner bark of this tree is used to combat the effects of flu symptoms at an early stage. The inside of the bark, either from the branch or the trunk, is chewed by the patient and the juice is swallowed, suppressing the signs of influenza, according to the KHs. From a pharmacological perspective, extracts of *Kirkia acuminata* have been associated with antibacterial properties (Mmushi, 2011). Similarly, extracts from this tree were found to be effective in treating diarrhoea and wounds, among indigenous groups (Maroyi, 2014).

**Figure 5.9**

*Mufandichimuka (Myrothamnus flabellifolius)* (Source:KH5)



Another herb mentioned by the KHs is *Mufandichimuka (Myrothamnus flabellifolius)*.

According to the KHs, this herb is used to prevent and treat various infections such as colds and TB. The herb consists of three parts, the twig, the soft leafy stem and the root.

Pharmacologically, *Myrothamnus flabellifolius* has been shown to contain alkaloids, flavonoids, phenols, saponins and tannins (Molefe-Khamanga et al., 2012). It is antidiabetic (Mothlanka & Mathapa, 2012) and antimicrobial (Van Wyk et al., 2002). *Myrothamnus flabellifolius* is used in medicine to treat colds and chest pain (Chigora et al., 2007).

**Figure 5.10**

*Mukomberwa (Crossopteryx febrifuga)* (Source: KH5)



The KHs also spoke of *Mukomberwa (Crossopteryx febrifuga)* as another medicinal tree they need to treat infections such as diarrhoea and flu-like symptoms. The bark of the tree is harvested without killing the tree. It is used either dried or in its raw state. The medicine is prepared by decoction of the bark and the extract is administered orally. Pharmacologically, this plant has been shown to contain alkaloids, flavonoids, saponins, steroids, tannins, terpenoids, anti-inflammatory and antimicrobial properties (Salawu et al., 2008). Terpenoids are chemicals used as anticancer, antimicrobial, antifungal, antiviral, anti-inflammatory, and antiparasitic agents (Cox-Georgian et al., 2019). Extracts of *Crossopteryx febrifuga* have been associated with the treatment of diarrhoea and dysentery (Chigora et al., 2007; Orwa et al., 2009).

**Figure 5.11**

*Mulemoni (Citrus limon)* (Source: KH5)



*Mulemon (Citrus limon)* is another plant used by KHs to treat infectious diseases such as influenza and cough. In most cases, the leaves are used to prepare the needed remedies. These leaves are mixed with *Eucalyptus camaldulensis* (*Mugamitiri*) and *Psidium guajava* (*Mugwavha*) leaves, and the extract is boiled in water and taken orally to treat flu-like infections. Extracts of *Citrus limon* have been shown to contain analgesic and antiseptic properties (Arias & Ramon-Laca, 2005). *Citrus limon* is used to treat sore throats and tonsillitis (Arias & Ramón-Laca, 2005), and cough, flu, and fever (Maroyi, 2011).

**Figure 5.12**

*Chifumuro (Dicoma anomala)* (Source: Researcher)



It is important to note that *Chifumuro (Dicoma anomala)* is the most popular herb used by KHS to prevent and treat infections, as evidenced by the statement, “...*Chifumuro (Dicoma anomala)* to prevent and treat infections in both the young and the old” (KH6). This herb is believed to have the power to uncover the causes of infections and weaken the severity of an infection (Maroyi, 2018; Shoko, 2007). The herb is prescribed for use as a proactive measure to protect the person from infection or to reduce the effects of infection. The herb is used in Africa to treat various diseases including fever, cough, colds, sore throat, abdominal pain, diarrhea, dysentery, constipation, intestinal worms, and sexually transmitted infections (Maroyi, 2018). For prevention measures, a ring made from the herb is tied around the neck, wrist or waist, and in situations where the cause is linked to the spiritual world, leaves of *Chifumuro (Dicoma anomala)* can be burned to chase away evil spirits. For treatment purposes (of influenza, constipation, intestinal worms, etc.) the leaves are boiled and taken orally.

In summary, most of these plants and herbs used by KHs have also been shown to have pharmacological benefits, such as antimicrobial, antiviral, analgesic, and anti-inflammatory properties for treating respiratory infections and other diseases. Indigenous methods of administering these herbs are varied and include practices such as steaming the body with herbs boiled in water, rubbing herbs on marked areas of the body, mixing herbs with food and drink, smoking dried leaves e.g. *Zumbani (Lippia javanica)*, inhaling e.g. the scent of grated leaves of *Zumbani (Lippia javanica)*, chewing and swallowing the juice of certain parts of the herbs, and spiritual purification by sprinkling the body with the prepared herbal remedies.

#### 5.4.2 Indigenous foods to prevent disease

The KHs emphasised that indigenous foods, mainly porridge made from sorghum, millet, and rapoko flour, were prepared with additions of herbal extracts from plants such as *Muruguru (Carissa bispinosa)*. Although the focus of this subtopic is on indigenous foods, the fortification of meals with this herb is briefly explored. The following responses were provided by the KHs in response to the question: *Can you explain how you prevent the spread of infectious diseases and treat them in your community?*

Table 5.5

#### Indigenous foods used in managing infections

Participant	Interviewee responses
KH7	We grew up eating traditional food and mainly porridge with herbal extracts...rarely got sick.
KH9	...eating cereals, pomegranates, <i>Nhunguru (Flacourtia indica)</i> , <i>Nhengeni (Ximenia caffra)</i> and <i>Maroro (Annona senegalensis)</i> . <i>Nhunguru (Flacourtia indica)</i> can be dried and can be eaten during its off-season, especially during the winter season.
KH6	We recommend traditional meals such as <i>sadza</i> (porridge) made from <i>rapoko</i> , sorghum, finger millet and traditional fruits... <i>nhunguru (Flacourtia indica)</i> , <i>nhengeni (Ximenia caffra)</i> , <i>maroro (Annona senegalensis)</i> , <i>nematamba (Strychnos spinosa)</i> in order to boost the immune system. Our traditional fruits keep us healthy all the time.

KH5	We prepare porridge from <i>matamba</i> ( <i>Strychnos spinosa</i> ) fruits, this porridge is mainly given to the young children as they grow up. Also we eat the fruit when ripe. We grew up eating these fruits and we never had any health problems unlike these days where we have turned to modern foods avoiding our traditional foods. I therefore encourage people to eat traditional fruits so that they keep health.
-----	--

It is clear from the preceding interview excerpts that indigenous foods promote health and wellness, as is evidenced by "We grew up eating traditional foods and mostly porridge with herbal extracts...we rarely got sick" (KH7). Indigenous foods are considered nutrient rich and good for health (Mbhenyane, 2017). This argument was supported by Bussmann et al. (2008) who indicated that indigenous foods have the potential for developing pharmaceutical products and for promoting food security. For example, *Muruguru* (*Flacourtia indica*) is commonly used by the Karanga people to treat cough and diarrhoea (Maroyi, 2014).

Chemical analysis has shown that *Muruguru* (*Carissa bispinosa*) contains analgesic, antiviral, and antidiuretic activities, together with lignans and sesquiterpenes (Patel, 2012). Lignans are naturally occurring polyphenols in plants, that have been associated with human health benefits, such as a lower risk of heart disease, menopausal symptoms, osteoporosis, and breast cancer (Rodríguez-García et al., 2019). Sesquiterpenes are natural plant products used to promote human health. They are used to "treat diarrhoea, burns, influenza, and neurodegradation, in addition to cardiovascular disease and cancer" (Chadwick et al., 2013, p.1).

The following fruits and their medicinal value were mentioned frequently by the KHs:

*Nhunguru* (*Flacourtia indica*), *Nhengeri* (*Ximenia caffra*), *Maroro* (*Annona senegalensis*), and *Matamba* (*Strychnos spinosa*). The image of these fruits can be seen from figures 5.13 to 5.16.

**Figure: 5.13**

*Nhunguru (Flacourtia indica)* (Source: Researcher)



The KHs mentioned that the fruits of *Nhunguru (Flacourtia indica)* are one of the most common indigenous foods that they believe keeps people healthy all the time. Although they are seasonal, the KHs encourage people, especially the young, to eat these fruits so that they are not easily affected by diseases in the community. It is seen as an immune booster.

The KHs shared their beliefs about this plant based on their experience and knowledge system, but the information from the literature review proved that the fruits of *Nhunguru (Flacourtia indica)* have anti-inflammatory, antimicrobial, antioxidant, and antimalarial effects (Kota et al., 2012). These fruits have tremendous medicinal benefits, for example, the presence of antimalarial properties in these fruits helps protect community members from malaria, one of the most dangerous infectious diseases in Africa. The other fruit that was described by the KHs is the (*Nhengeri*) *Ximenia caffra* (see Figure 5.14).

**Figure 5.14**

*Nhengeni (Ximenia caffra)* (Source: Researcher)



The KHs also recommend the fruits of *Nhengeni (Ximenia caffra)*, which are necessary for strengthening the immune system. These fruits are widely available in the rainy seasons and the KHs encourage people to eat them, so that they are protected from many diseases. The KHs did not mention any specific diseases that people can protect themselves from by eating fruit of *Nhengeni (Ximenia caffra)*. Interestingly, the literature found that these fruits contain a number of compounds that have medicinal properties, such as flavonoids, phenols, and tannins, as well as antimicrobial activity (Mulaudzi et al., 2012), antibacterial activity (Mulaudzi et al., 2011), and antioxidant activity (Maikai et al., 2010). The presence of such compounds with medicinal value is encouraging for the promotion of further research or studies on the development of bioactive compounds from locally available plants.

Another fruit that is considered to have therapeutic uses is *Maroro (Annona senegalensis)* (Figure: 5.15).

**Figure 5.15**

*Maroro (Annona senegalensis)* (Source: Researcher)



The KHs stated that the fruit of *Maroro (Annona senegalensis)* are used in their communities to maintain the health of the people. This fruit is green when immature and turns orange when fully ripened. The KHs referred to this fruit as vital for keeping the body healthy, and protecting one from influenza and respiratory infections. The literature search revealed that this fruit contains antioxidants (Munodawafa et al., 2010). *Strychnos spinosa* is another plant whose fruit is considered to be beneficial to health according to the KHs (see Figure: 5.16).

**Figure 5.16**

*Mutamba (Strychnos spinosa)* (Source: Researcher)



The fruit of *Mutamba* (*Strychnos spinosa*) are considered essential by the KHs to develop a strong immune system. The fruit can be eaten directly or made into a fruit pulp, which is considered very nutritious and able to strengthen the immune system, especially in children. From a pharmacological perspective, the fruits of *Strychnos spinosa* contain bioactive compounds such as sterols and triterpenoids (Hoet et al., 2007). The benefits of eating indigenous foods have been underscored by both KHs, and pharmacological analyses by Euro-Western-trained scientists.

In addition to consuming indigenous foods and herbs that strengthen the immune system and prevent and treat infections, KHs also advocated behavioural methods to minimise the spread of diseases.

#### 5.4.3 Behavioural strategies for prevention of disease

The main behavioural strategies shared by the KHs are isolation and quarantining and not sharing utensils, items or clothing. The responses presented in Table 5.6 were elicited to

answer the following question: *What community practices are there in place to protect against infectious diseases including possible emerging infections?*

Table 5.6

*Prevention through isolation, quarantining, and avoiding sharing of items*

Participant	Interviewee response
KH2	Traditionally, leprosy and TB patients were isolated from other community members, housing them in caves, valleys, and isolated makeshift shelters.
KH7	... not allowed to share utensils, bedding, or clothing. Provisions (food, water, medication) are delivered to their isolation centres.
KH1	Clothing and utensils of the dead are not supposed to be used before a cleansing ceremony is done. This is to avoid angering the dead who may cause spiritual suffering to the living.

Isolation and quarantining of the sick is a common practice of KHS to control the spread of infectious diseases. KHS are aware of the existence of infections such as leprosy, that can be transmitted from one person to another if patients are not isolated from the rest of the community. Isolation of the sick has always been common among the Karanga, according to the KHS. Patients were housed in caves and isolated makeshift shelters. This practice is also reflected in modern health care with the construction of isolation wards. KHS emphasised safe practices, such as not sharing items used by patients with infectious diseases. KHS' advocacy of this practice, is indicated by interview excerpts from KH1 and KH7. From a traditional perspective, people were not allowed to share utensils or clothing because it was believed that infections could be transmitted through these items. People were not allowed to use items left behind by sick people until they had been disinfected. The KHS believe these are hygienic practices to increase the safety of the community (KH1).

#### *5.4.4 Common community health practices*

A prescription for adherence to community health practices among community members was highlighted by KHS. The following are responses to the interview question: *What practices*

*are in place in your community to protect your population from infectious diseases, including possible emerging infections?*

*Table 5.7*

*KHs' responses regarding good health practices*

Participant	Interviewee response
KH6	At the entrance of each homestead there is a washing point ...wash hands before shaking with other people.
KH4	<i>Ruredzo (Dicerocaryum zanguebarium)</i> is our soap for washing hands. The soapy extract is used as a cleaning detergent, even for hair shampooing. We place <i>Ruredzo (Dicerocaryum zanguebarium)</i> leaves in water and allow the juice of the leaves to soak out, producing a soapy liquid that is then fed into the reservoir of the washing point.
KH9	We use a long-handled traditional cup to fetch water from water sources (shallow wells) and storage containers to avoid contaminations.

The following is an example of a hand washing point that is located at the entrance of each homestead.

**Figure 5.17**

*A hand washing point* [Source: Trinos and Mudaly (2020)]



Hygiene is facilitated by a handwashing station, (as depicted in the above figure), outside each homestead, that is equipped with the readily available indigenous *Ruredzo* (*Dicerocaryum zanguebarium*) (Figure 5.18) as an alternative to soap. This hand washing station promotes hand hygiene because the washing station is located outside the homestead and every person who enters the homestead is expected to wash their hands. Figure 5.18 shows a *ruredzo* (*Dicerocaryum zanguebarium*) plant used by the KHS to prepare the washing liquid.

**Figure 5.18**

*Ruredzo* (*Dicerocaryum zanguebarium*) (Source: KH3)



This plant is used by the Karanga people in water as a cleanser, shampoo and/or disinfectant. The leaves of the plant are put into cold water and left for at least three hours. Then the mixture is shaken and the leaves are filtered to obtain a soapy liquid, which is then used as an alternative to soap.

*Ruredzo (Dicerocaryum zanguebarium)* is a common plant in Africa that grows mainly in sandy soils. It produces spiny seeds that go dormant in winter and germinate during the rainy seasons.

The KHS also emphasised that good health in the community and at home is promoted by using long-handled indigenous cups (Figure 5.19) shown on top of the container, to fetch water from a common source.

**Figure 5.19**

*Mukombe (Long-handed cup) (Source: KH9)*



The above mentioned practices, among others, serve to prevent the spread of infectious diseases through contamination, and are used to manage infectious diseases among the Karanga people.

### **5.5 Sources, transmission, and preservation of IK**

The KHs shared several ways in which knowledge is generated, preserved and transmitted, in response to the following questions: *How do you educate the community about infectious diseases?*

*How do you keep your knowledge and transmit it from generation to generation?*

Table 5.8

*KHs' perspectives about source, transmission and preservation of knowledge*

Participant	Interviewee response
KH6	Our knowledge comes from our ancestors. Through dreams we get much information and keep in memory. Story-telling and songs pass knowledge down generations
KH1	Through our Spirit Mediums and <i>Izangomas</i> we receive information from the underworld. Knowledge of plant healing is a spiritual gift for those who are called.... Aunties, grandparents and community elders are responsible for guiding and educating the youth.
KH2	Lucky birds or insects can help people recognise various plant remedies when there is a problem in the family.
KH8	Ceremonies, songs and dances can be used as a means of communicating with the ancestors.
KH7	We often sit by the fireplace in the evenings and tell our children information about... The young learn through playing activities such as fishing, fruit gathering, healing, etc. We take the youngsters into the bush and show them the real plants and how to harvest and prepare medicines. This knowledge is in me and sometimes I got it from my ancestors. We also have our knowledge represented in artefacts such as wooden knobkerries, drawings and stone made items
KH9	Some people may seek knowledge of plant healing from well-known healers.... The healer consulted helps these people and in most cases no payment was asked...
KH2	We now use voice notes and audios to pass information during Covid-19. Our knowledge is kept in sculptures (which can be made from wood or stones), ritual markings, harvested herbs, stone carvings, and images from carpentry
KH5	People learn by doing and acting. For example, taking the roles of medicine men, rainmakers, or <i>Izangomas</i> .

*5.5.1 Sources of IK*

The role of the ancestral spirit as a source of information was emphasised. KH6 had the following to report, "Our knowledge comes from our ancestors. Through dreams we receive a lot of information and keep it in our memory. Through stories and songs, knowledge is passed from generation to generation" (KH6). The KHs are aware that they are under the guidance of the spirits of their ancestors. They believe that ancestral spiritual visitations provide wisdom for dealing with infections. Therefore, ancestral spirits are the original

source of knowledge about health, according to KHs. This knowledge is controlled by the ancestors, who decide who should have access to it (Lebaka, 2018; Maluleka & Ngulube, 2018; Mokgobi, 2014). Knowledge can also be obtained through dreams, as KH6I notes. For example, when a family member falls ill, the same person or another member of the family or community, has a dream that may relate to the treatment needed (Maluleka & Ngulube, 2018). Related to this are the auspicious birds and insects that are believed to guide the KHs to beneficial medicinal plants. "Lucky birds or insects [for example the ground hornbill (*Bucorvus leadbeateri*)] can help people recognise various medicinal plants when there is a problem in the family" (KH2).

Bruchac (2014) describes elders in the community as the keepers of knowledge. Thus, they are regarded as the custodians, repositories and preservers knowledge.

#### *5.5.2 Transmission of IK and indigenous ways of knowing*

The KHs emphasized that oral exchange of knowledge is common among indigenous communities. The elders were mentioned as an important source of knowledge (*pedagogue*) in the community. In this vein Iseke-Barnes (2009, p.25) noted that "elders are the educators of children, youth, adults and communities' storytellers and historians". KH1 referred to the elders in the community as those who bear the responsibility of raising the young. This assertion is supported by Joseph (2014, p.12) who acknowledges that "each community elder possesses an invaluable, distinct oral knowledge that includes wisdom, perceptions, innovations and practical experiences linked to lived experiences of the indigenous people". Knowledge is usually passed on orally by the KHs to the youth and other members of the community. Knowledge transmission in indigenous communities occurs through oral traditions, social activities, dances, ceremonies, ritual practices and songs, among other activities. "Ceremonies, songs and dances can be used as a means of communicating with the

ancestors” (KH8). This therefore implies that IKS has a well-established educational system with specific methods, settings, teachers, learners, content, cultural norms and values that underpin the dissemination process.

Traditional apprenticeship is another approach through which IK could be taught. The KHs mentioned field visits as necessary for acquiring knowledge on plant usage for healing. In this method, the person who learns acts as an assistant to the other person who knows (the KH). The healer acts as a mentor and the mentee acquires skills and knowledge from the healer. The healers are the keepers of the knowledge and are guided by ancestors as their mentors (Maluleka & Ngulube, 2018; Sodi et al., 2011). KHs engage in demonstration, imitation, and repetition until knowledge is successfully constructed by practitioners in training.

Evening gatherings, dramas, and observations from the cosmos were also identified as some of the platforms used to teach IKS. In addition, KHs emphasised that they use their mobile phones to take voice notes and photos to share information about infectious diseases with patients and the public. This reflects on how KHs are tapping into technology and promoting health-related communication.

Knowledge can also be gleaned from preserved materials, sculptures, ritual markings, stone carvings, and images from carpentry, according to the KHs. These are then used as teaching and learning aids, when the young are being guided into indigenous traditional healing. In this regard, models such as an animal/bird on a knobkerrie, symbolises a particular body of knowledge (Bruchac, 2014) that is relevant to the community in question. These items are used as a way of preserving knowledge and as teaching resources among the Karanga people.

### *5.5.3 Preservation of IK*

The most common approach to preservation of IK is by using one’s memory, as articulated by KH7: "This knowledge is in me and sometimes I got it from my ancestors". The statement

shows that IK is preserved in the memory of the bearer, from whom most healers are descended, and whose wisdom and source comes from his/her ancestors (KH7). This shows that among the Karanga there are no written documents to keep IK, but there are resourceful individuals who carry the responsibility of the 'IK library'.

### **5.6 Chapter summary**

The results of research objective one, show that KHs have a great deal of knowledge about infectious diseases. This knowledge includes the perceived causes of infections, ways to prevent and treat infectious diseases, identifying the source, transmission, and preservation of their knowledge.

In general, the Karanga world revolves around ancestral guidance. Everything that happens is intricately connected to the ancestors. From an African perspectives infections are caused by ancestral spirits; healing emanates from an ancestral prescription; prevention of infections and mishaps requires ancestral worship; knowledge is generated from a spiritual world; knowledge is transmitted in spiritual form, memories, artefacts, and traditional collections; and the transmission of knowledge involves both social and practical encounters. Therefore, spiritualism is the driving force behind African survival (Idang, 2015). Thus, the existence of the Karanga people is considered to be under the supervision of the unseen, spiritual beings in the form of their ancestors.

However, the KHs also attribute the outbreak of infections to vectors, an understanding that is consistent with the conventional health care system.

Additionally, Karanga healers offered a variety of medicinal herbs that they utilise for both illness prevention and infection treatment. According to the Karanga healers, most plants contain chemicals that can be used to treat a variety of ailments. Pharmacological tests have offered proof of this.

The findings that address research questions two and three are presented in the following chapter.

## **CHAPTER 6**

### **FINDINGS BASED ON RESEARCH QUESTIONS TWO AND THREE**

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## **6.1 Introduction**

In the previous chapter, feedback related to the indigenous knowledge (IK) for addressing infections, was presented and analysed. These results were related to research objective one. In this chapter, I present and analyse the data related to research objectives two and three. First, the results related to research objective two, which was to interpret the Biology curriculum for pre-service teachers in terms of content, pedagogy, and philosophical orientation, will be presented. To elaborate on this, the results related to corresponding research question two are presented under the following themes: Pre-service teacher education, criteria for document analysis, general information about the Biology curriculum for pre-service teachers, relevance of modules to emerging infections, prevention and treatment of infections, ubiquitous epistemologies and pedagogy, and integration of IK into the curriculum.

Secondly, this chapter presents the results to the third research question, which sought to determine how IK of infectious diseases from Karanga healers (KHs), can be incorporated into the Biology curriculum for pre-service teachers. This research question is addressed under the following themes: Arguments for including IK in teacher education: views from pre-service teachers, best approaches to include IK into the existing curriculum, and challenges to inclusion.

## **6.2 Epistemological orientation: Biology curriculum review**

Document analysis was conducted collaboratively by pre-service teachers and myself in order to understand the epistemological orientation of the modules four Biology modules for pre-service teachers. Prior to this document analysis the pre-service teachers were exposed on how to analyse a document, in this case, the Ordinary Level Biology syllabus. The selection

of the Ordinary Level Biology syllabus (Appendix J) was purposive because it prepares learners to further studies in Biology .

#### *6.2.1 General information about the Biology curriculum for pre-service teachers*

Analysis of the document revealed that the 2016 Biology Curriculum was created in the Department of Biological Sciences at Midlands State University (MSU). It also emerged that MSU is the sole publisher of the document. The Biology curriculum for pre-service teachers was developed for post Advanced Level holders or holders of a similar recognised qualification from any institution. These qualifications could include a diploma or degree deemed appropriate or related to the field of biological studies, e.g., holders of a diploma in science education from any university of education or a diploma in biological subjects from a polytechnical college. Therefore, the Advanced Level can be taken by a person who is already in possession of an initial qualification such as a diploma or certificate in the relevant field. Upon completion of the four-year programme, graduates receive a Bachelor of Education Honours Degree in Biology (B. Ed. Hons.).

The modules examined were those with science content that can be credited toward various degrees, including teacher education. These modules are taught in addition to education-related modules such as Information and Communication Technologies, Educational Management, Sociological Foundations of Education, Curriculum Studies, Assessment and Evaluation Techniques, Gender Studies, Entrepreneurship for Educators, Financial Appreciation in Education, and Contemporary Issues in Education. Therefore, this program is a blend of pedagogy and content knowledge. Biological studies are preferred, although interrelationships with other areas of study are visible in the program. This is illustrated by the following excerpt from the MSU Biology curriculum for teachers.

The interrelationship of biological sciences to other subjects is stressed, although, the distinctiveness of Biology should also be apparent (Midlands State University, 2016, p. 4).

The introduction clearly describes the programme of study designed to promote the acquisition of biological content and investigative skills. In this curriculum document content is only from the domain of western ideologies. This is distinctly different to the way in which African knowledge is organised. African communities do not divide knowledge into specific disciplines, e.g., science fields such as Biology, Chemistry, and Physics (Zidny et al., 2021). In reality, scientific concepts are presented in the African context as skills and knowledge essential for survival. For example, knowledge about medicinal plants used for healing is not referred to as Biology. Positioning the Biology curriculum (from which the four modules were selected), as open to cultivating relationships with other disciplines, is welcome from the perspective of a pluralistic curriculum (Daryai-Hansen et al., 2015; Santos, 2014). Thus, the curriculum must address issues of linking knowledge systems to promote holistic, sustainable development (Breidlid, 2009; Senanayake, 2006; Zidny et al., 2020).

The programme of study aims to prepare students for study in biological fields, advanced study, solving community challenges, and nation building. This is illustrated by the following statement in the broader aim:

After completing the programme, students should be able to: work in Biology related fields, carry out postgraduate studies in Biological Sciences and other related fields, provide solutions to environmental problems and participate actively in the development of the country (Midlands State University, 2016, p. 4).

The goals of the programme are broad and include several areas relevant to each field of study. For example, environmental studies and nation building are central constructs in promoting sustainable development. One of the most important attributes of a curriculum is its ability to promote relevance, contextualisation, and inclusivity (Fernandes et al., 2013). This would develop the pre-service teachers' capacity to solve problems, that is, finding solutions that affect one's immediate community, and this forms the basis for nation building.

Every educational programme has a clear goal on which the ontological, epistemological and axiological levels are built. Developing the ontological goal of the curriculum is rooted in providing a complete representation of different knowledge systems (Katis et al., 2018). The programme aims to produce competent workers who can compete in the labour market. In meeting this objective, the B.Ed. (Hons) programme aims to train students who can be employed in the following areas:

Education (schools and colleges); Research institutions (entomologists, parasitologists, botanist); Medical laboratories; National Parks (botanists); Pharmaceutical industries (microbiologists); Food industry; Plant and animal breeding; Natural History Museums as curators (Midlands State University, 2016, p. 5).

It is clear from the list of target occupations that the program prepares teachers for work that is remote and unrelated to their life experiences which are informed by IK, because no such field of employment exists in the African indigenous context. Instead, African people are specialists in various survival activities, which are not recognised as scientific disciplines. Therefore, graduates are able to participate in an active workforce in the established industries rooted in Euro-Western thinking and which does not adopt holistic approaches to community development. In this regard Naamwintome and Millar (2015, p.3) posited that the “engine of growth and sustenance for the traditional African is never the market, the profit motive or the large-scale mass production and economies of scale as is the case with the west but a production system which is valued beyond economics”. The mention of curators in national museums is encouraging, but the museums we have today promote foreign ideologies rather than a local representation of indigenous peoples and their history (Ngcobo, 2018).

The Biology curriculum for pre-service teachers covers a wide range of topics, including botany, cytology, animal and plant physiology, biotechnology, ecology, mycology, genetics

and evolution, and virology. This study is linked to immunology, bacteriology, animal parasitology, microbial genetics and virology as they relate to infectious diseases. These modules were purposefully selected because they are relevant in answering one of the study's questions: *(To what extent is knowledge of infectious diseases presented in the Biology teacher education curriculum? Why is this the case?)* that sought a deeper understanding of how the Biology curriculum for pre-service teachers addresses topics related to infectious diseases. The following table provides curriculum information of the four modules which are related to diseases, studied at MSU.

*Table 6.1*

*Curriculum descriptors of modules under study*

Module	Year	Semester(s)	Credits	Core or Elective
Immunology	1	2	4	Core
Bacteriology	2	1	4	Core
Parasitology	4	1 & 2	4	Elective
Microbial genetics and virology	4	1 & 2	4	Elective

The table shows that bacteriology and immunology are core courses. This means that these courses are compulsory and therefore mandatory for pre-service Biology teachers.

Parasitology, microbial genetics and virology are electives, and therefore not mandatory for Biology teacher education.

The following table shows an in-depth analysis of the four modules. The criterion for analysis was based on identifying how each module relates to each of the following: diagnosis of infections, prevention and treatment of infections, how emerging infections are addressed, epistemologies and pedagogical orientation, how knowledge producers are represented, and representation of IK.

Table 6.2

*General Overview analysis of the four modules studied at MSU*

	Immunology	Bacteriology	Parasitology	Microbial genetics and virology
Diagnosis of infections	Laboratory based	Laboratory based	Laboratory based	Laboratory based
Treatment and prevention	Clinical (reliance on Euro-Western medication)	Clinical	Clinical	Clinical
Addressing emerging infections	Theory of vaccination	History of bacteriology, Bacterial genetics	Host response and defence Parasite evasion of immunity	Mutations
Epistemologies and pedagogical strategies	Euro-western-lab based experiments, demonstrations, research	Euro-western-lab based experiments, demonstrations, research	Euro-western-lab based experiments, demonstrations, research	Euro-western-lab based experiments, demonstrations, research
Knowledge producers	Euro-western	Euro-western	Euro-western	Euro-western
Incorporation of or reference to IK	None	None	None	None

### *6.2.2 Relevance of the modules to emerging infections*

There is ample evidence that the modules prepare pre-service teachers for studying emerging infections. Immunisation theory for example, presented in the context of immunology, shows how pre-service teachers are equipped with knowledge about preventing diseases in the community. Most of these diseases can be widespread, but vaccination theory also addresses the possibility of controlling emerging infections. Mutations and genetic changes, viral

genetics, and bacteriology also deal with the possibility of emerging infections. This can be inferred from the current situation in which the coronavirus has mutated into several variants worldwide. Therefore, the inclusion of such a topic is necessary to equip pre-service teachers with knowledge of current and emerging infections. Inductively, the four modules are relevant to dealing with emerging infections.

### *6.2.3 Prevention and treatment of infections*

The four modules deal extensively with the principles of infectious disease prevention and treatment by relying exclusively on Euro-Western practices that define the conventional health care system. This monolithic view suggests that pre-service teachers are exposed to a single episteme which is positioned as the only one worth studying, and this represents the complicity of universities in perpetuating the muting of indigenous knowledge. The four modules present the prevention and treatment of infections from a biomedical perspective. In immunology, for example, immunisation and vaccination are central to the prevention and treatment of infections. This is also evident in bacteriology, where aseptic and sterilisation techniques are key to disease prevention. All of this has its roots in the Euro-Western notion of health and well-being. Although this is useful it needs to be integrated with IK, in regard to infectious diseases, to promote an all-inclusive curriculum that respects different viewpoints (Pridham et al., 2015) within the African context.

### *6.2.4 Ubiquitous epistemologies and pedagogies*

Analysis of the modules showed that laboratory-based experiments and lecture methods were the preferred pedagogical strategies. This reflected a Euro-Western scientific approach to the construction of knowledge. The content and pedagogy in these modules are silent about IK and the African context.

The content and pedagogy (laboratory-based experiments rooted in the nature of science) in the four modules are based entirely on Euro-Western perspectives. In immunology, for example, the content on antibody-antigen interaction, vaccination theory, immune tolerance, and HIV/AIDS, have been developed using the Euro-Western approach. Host response and defence, parasite evasion of immunity, and parasite control, are topics that have also emerged from a Euro-Western perspective. There is no mention of rich repository of AIKS on boosting immunity, for example, the use of the African potato for enhancing immune system (Matyanga et al., 2020).

#### *6.2.5 Integration of IK in the modules*

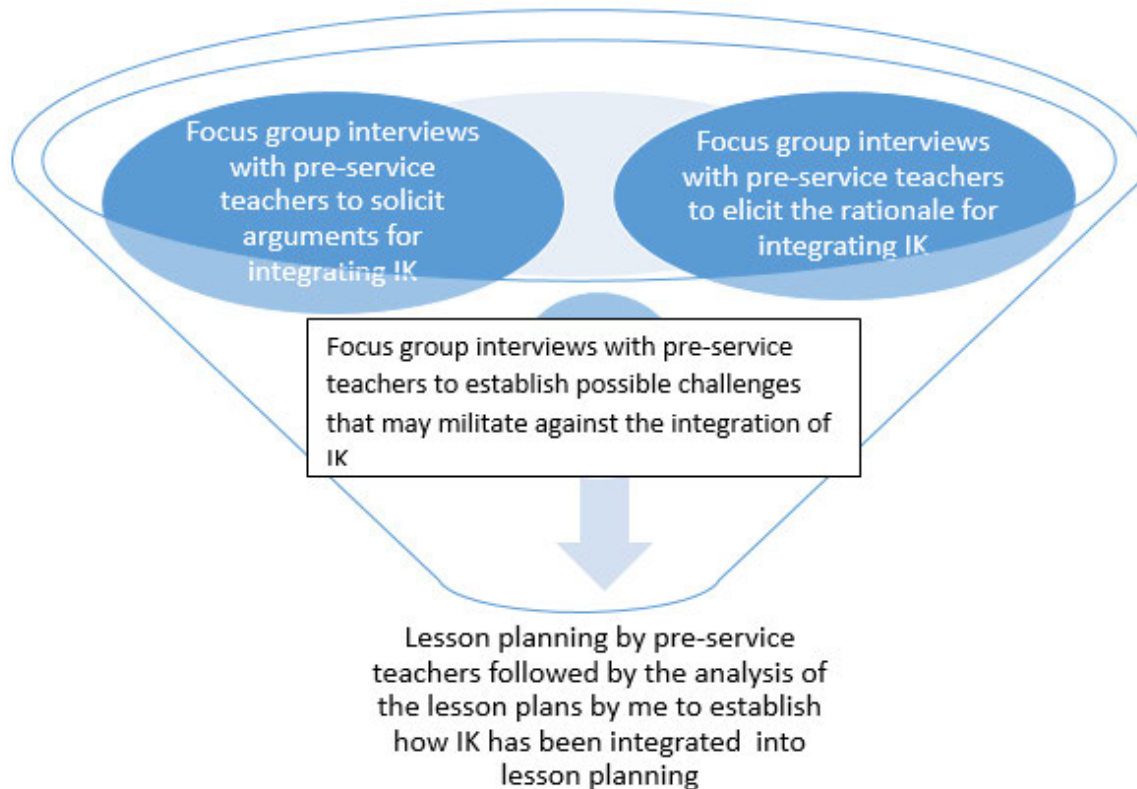
In all four modules, IK content and pedagogy was excluded. Additionally, no knowledge producers of non-Euro-Western descent were mentioned. Reflectively, South African scientists such as Salim Abdool Karim were excluded. This reflects how the current educational system privileges Euro-Western epistemologies over African indigenous epistemologies. This observation is evident in the literature where Kaya (2013) and Msila (2017), among others, lament the peripheralisation of African indigenous knowledge in the curriculum, especially at the tertiary education level.

### **6.3 Possible ways of including IK into the Biology modules**

To explore research question three, I used the schematic diagram below, showing my data generation process for this question.

**Figure 6.1**

*Data generation process for research question three (by researcher)*



To explore this question, I first presented the arguments for inclusion of AIK, made by pre-service teachers during the FGIs. Due to the breadth and depth this research question, focus group interviews were conducted in multiple sessions. The first session was intended to respond to the following question: *Do you think it is a good idea to include IK knowledge content and practice of infectious diseases into the Biology module for pre-service teachers and why?* This question sought the opinions of pre-service teachers about whether or not it was appropriate to include IK into their modules. The second session was a follow-up to the first session, and the key question was: *If you think IK of infectious diseases needs to be integrated into the Biology module, what IK content and approaches do you recommend? Please provide a rationale for your choice(s).* The purpose of this question was to find out what inclusion approaches are suggested by pre-service teachers. The third FGI session was

designed to answer the question: *What challenges might you encounter when trying to integrate IK of infectious diseases into the Biology module? How do you think these challenges can be addressed?*

Secondly, I present the lesson plans that were co-authored by the pre-service teachers to show the IK content and approaches deemed valuable in their lesson planning. The pre-service teachers used interview transcripts containing findings that were generated from KHs to build their knowledge about IK.

Thirdly, the document analysis of the lesson plans was conducted by me. The analysis considered the following: the intended audiences of the lessons, objectives (purpose), type of document, content knowledge, teaching/pedagogical strategies, cross-cutting themes, and assessment criteria. The analysis was conducted using the lesson plan analysis schedule (Appendix J).

In recent years, many scholars have advanced the discourse of decolonising curricula through indigenisation. This study was informed by Jacobs' (2015) categories of IK to inform the best approaches to such integration. According to Jacobs (2015), IK can be divided into the following categories:

1. IK, which can be explained from a European-Western perspective, i.e., indigenous knowledge that cannot be explained from a traditional perspective but whose meaning can be explained from a Euro-Western perspective. In this regard, Jacobs (2015) gave an example of mixing salt and lime juice to remove stains from clothing; this is an example of acid-oxide reactions that could not be explained from an indigenous perspective, even though they are commonly used by indigenous people in the Western Cape province of South Africa.
2. IK that can be explained with a Euro-Western lens, but this knowledge is not available for such engagements, due to a lack of documentation. This reminds one that AIK is, to a larger extent, undocumented and therefore any epistemological exploration becomes difficult. In

this case, Jacobs (2015) elucidates that there are many indigenous plants used to treat infections, but they have not been subjected to pharmacological analysis. In essence, the lack of pharmacological analysis by Western scientists, and lack of documented ways of using medicinal plants by IK holders, result in this knowledge about medicinal plants being excluded from mainstream curricula.

3. IK can be linked to science, but the philosophical explanations do not match. Jacobs (2015) attempted to show how diabetes mellitus is explained from both worldviews, with elements of dissonance; from an indigenous perspective, diabetes is a consequence of excessive sugar intake, where excess sugar exacerbates a diabetic condition from Euro-Western perspective.

4. Finally, Jacobs (2015) identified indigenous knowledge for which there is no Euro-Western explanation. The example given here was of cutting hair during a full moon to make it grow faster and to its full length, by people in the Western Cape province of South Africa, with no western input on this behaviour.

Finally, I discuss the potential challenges facing the canon of decolonisation in teacher education, based on the pre-service teachers' views during FGIs.

### *6.3.1 Arguments for inclusion of IK: Views from pre-service teachers*

The pre-service teachers were asked the following question: *Do you think it is a good idea to include IK knowledge content and pedagogy of infectious diseases into the Biology module for pre-service teachers? Explain your views.* Each of the participants strongly believed that IK is worth including in their curriculum. This is highlighted in the following excerpts from the FGIs with five pre-service teachers.

Table 6.3

## Views of pre-service teachers (PST) toward the inclusion of IK

Participant	Interviewee response
PST1	Including IK will help to tap into our knowledge that had been lost due to colonisation, and is not in the curriculum.
PST4	Our education has nothing resembling our local knowledge, I think its high time we must consider adding indigenous knowledge into the curriculum at all educational levels. I think we must expose learners to use local knowledge and resources so that as they learn they understand themselves, their needs, and community needs at large. In fact our knowledge is easily accessible, unlike the Euro-Western knowledge that one pay(s) for and hence its products are sold.
PST2	The challenge facing young graduates worldwide is finding a job. This reflects a failed education system that focuses only on getting employment rather than community participation. This can only be solved if we include IK, that is, knowledge about the place and the people. Why don't we have knowledge of plant healing in our health modules? In our daily lives we use these herbs to treat and prevent ourselves from infections, including this COVID-19.
PST3	We cannot run away from witchcraft and sorcery because both are evil. We must not ignore our ancestors because all our lives depend on ancestral spirits for protection from the evil spirits and for guidance on what our community should do to maintain peace and good health. Also we must respect our traditional foods and herbs. Because some diseases cannot be treated from a European or Western medicines (but can be treated using IK) ... shows that ancestors are there. The idea of traditional foods, such as <i>sadza</i> /porridge made from millet or sorghum and wild fruits, which boost the immune system, need to be included in the curriculum.
PST5	IK lowers costs especially with our economy in mind. This is a pandemic (referring to Covid-19), we cannot rely on every drug being imported. The community may be helpless if it neglects IK in favour of conventional health care. For example, if one is bitten by a snake, <i>tinoona</i> (we see) IK <i>ichishandiswa</i> (is used) and sometimes the person is not sent to a clinic. The elders with their knowledge settle such accidents. Therefore, IK should be included in the curriculum considering how useful it is and how much many communities rely on it. In fact we need to have our values, norms, and beliefs

	embedded in our modules. I believe what we are learning reflects an alien culture.
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In general, all five of the pre-service teachers supported the idea of including IK in their Biology modules. They cited several arguments for the inclusion of IK. The first reason for including IK is based on the need to decolonise the curriculum. This follows the general observation that education is often being politicised and serves the interests of the colonisers instead of being representative and reflective of different worldviews. For example, PST4 suggests that including IK is a way to redress colonial imbalances that have subjugated and marginalised IK from mainstream education. This is supported by Kaya (2013), Kumalo (2018), Kumalo and Praeg (2019), Le Grange (2014; 2016), Lephakga (2015), Mpofu and Vhurumuku (2017), Mudaly (2018), and Prinsloo (2020). The exclusion of IK in teacher education modules became evident when we analysed the modules of the current teacher education curriculum, which privileges Euro-Western ideologies in both content and pedagogy (see Table 6.2). This reflects the continuation of colonialism (coloniality) in the education system.

Secondly, a more relevant curriculum should be created, because a greater percentage of African people rely on IK for primary health care, where herbal medicines are used to treat many infections. This is supported by PST2, who questioned: "Why don't we have knowledge about herbal medicine in our health modules? In our daily life, we use these herbs to treat and protect ourselves from infections, including this COVID-19". The usefulness of IK is based on the observation that about 70-80 percent of the world's population relies on traditional and modern medicine for primary health care (World Health Organisation, 2019). The idea of promoting relevance was echoed by PST2, who lamented that promoting

certification over relevance results in graduates not being equipped with problem solving skills.

Thirdly, to create a holistic curriculum that is culturally inclusive, curriculum components should address the cultural values of the community in which it is implemented. Indeed, the curriculum should be an excerpt from the culture of the people it is intended for. This idea was supported by PST5 who said, " In fact we need to have our values, norms, and beliefs embedded in our modules. I believe what we are learning reflects an alien culture." PST5's voice reflects a distressed attitude towards curriculum matters, where students feel that their cultural values are not represented in the curriculum, but that they are forced to assimilate only foreign material. In this regard, education should reflect people's culture (Giorgetti et al., 2017; Offorma, 2016). Some scholars argue that the Euro-Western knowledge we are proud of, is a representation of a culture (Akena, 2012; Kaya & Seleti, 2013). In fact Akena (2012) argues that there is a general motive in knowledge production relative to the society in which it is taught. Thus the Euro-Western type of education that defines the current higher education curriculum, reflects the cultural attributes of the West and its allies. This led to calls for the inclusion of AIK as a way to respect local people and their knowledge systems (Chilisa, 2012).

### *6.3.2 Best approaches for IK inclusion: Views of pre-service teachers*

Each focus group interview session was conducted with five pre-service teachers to gather information about how to integrate IK into the current Biology curriculum for pre-service teachers. The pre-service teachers suggested several ways in which IK could be integrated into their modules. These options are pragmatically oriented and are supported by excerpts from the interviews with the PSTs and the lesson plans they created. To distinguish among these approaches, those interviews and lesson plans sharing a common approach, are each

presented separately. This is followed by a discussion of the interview data and the analysis of the lesson plans. In this regard, pre-service teachers had the following to contribute in terms of IK content and approaches for inclusion. Their contributions were based on them having had the opportunity to study both the interview transcripts and photographs from the KHs.

*What are the best approaches which can be used to integrate IK of diseases management into the current Biology curriculum? You may explain:* is the question that was asked pre-service teachers to solicit their views on bests approaches that can be used to integrate IK into their Biology modules.

Table 6.4

*Towards integration of IK: Views of pre-service teachers*

Participant	Interviewee response
PST1	Our knowledge on plant healing can be taught at the same side with the science in schools. We can have a topic for example on the prevention of diseases being planned for in different lessons or periods. In this way we can have knowledge on disease prevention taught on its own, Euro-Western preventive approaches taught separately so that we do not confuse or risk one being favoured over the other. I however propose that a linking part is necessary once all has been done to establish how the two knowledge systems can help each other to keep the communities healthy.
PST2	In our methodology course we learnt that one can invite another person from within the school staff or outside who is believed to know better in a particular topic, since we want IK to be included into our curriculum, I think we can also ask healers from the community to come and teach us on certain topics for example plant healing, or we can go and learn from their homes (by witnessing practices in KHs natural settings). We can also visit particular areas to learn about medicinal plants. I realised that our healers have a lot information on plant healing, but it is not included into our modules. I also learnt that much of the indigenous can be learnt better in the communities, therefore I think we carry out projects and researches in the communities so that we get a rich collection of IK on diseases and document it in books.
PST3	We know many herbs/plants used to treat infections, and now we learn from biochemical analysis that these herbs/plants have many substances that are

	used to cure some diseases. I think we can teach IK and Euro-Western knowledge of curing diseases side by side. Using information from Karanga healers we see that when one is learning about plant healing it starts from knowing the plant, what part is used, how to harvest that part, prepare the medicine, and giving the medicine.
PST4	I think our university must design a learning programme that has both IK and Euro-Western knowledge. When we carried out analysis of the four modules we discovered that IK is not part of these modules, but we learnt that the KHs have a lot of this knowledge which they use to diagnose, prevent, and treat infections.
PST5	From what I learnt indigenous knowledge is useful, and we have many elders in the communities from whom we can learn a lot. I propose we can call these elders to come and teach us in our colleges, and in turn we can visit these elders in the communities to learn more about indigenous knowledge of infectious diseases. To keep this information we can also audio record or video record.

Armed with knowledge from the KHs and the Biology curriculum, the prospective teachers collaborated to create a lesson plan based on the previous excerpts. As mentioned earlier, these pre-service teachers were trained in lesson planning, but they had not learned how to incorporate IK into their planning. The lesson plan was prepared for pre-service teachers during their period of training, thus adding to or supplementing the current pedagogy modules at university. The following is the first of three lesson plans that the pre-service teachers submitted. The idea for PSTs to decide on possibilities for including IK in their university curricula was a deliberate attempt to obtain “knowledge from below” which can potentially inform lecturers’ practices.

**Lesson Plan 1****Learning Area: Biology****Date** .....**Topic and Content:** Immunology: Causes of infections**Resources/Apparatus:** videos on infectious diseases**Cross cutting themes:** Cultural heritage, respect, inclusivity, equity**Objectives:**

- I. Define “health” from both the indigenous and Euro-Western perspectives
- II. List different causes of disease from the Euro-Western and indigenous perspectives
- III. Compare the causes of infections from both knowledge systems.

**Recognition of Prior Knowledge:**

Pre-service teachers have different ideas on the causes of infections depending on their worldview and recognition of prior knowledge (RPK)

**Introduction:**

The lecturer introduces the KH as a guest and resource person.

**Lesson development:****Stage 1:**

1. Lecturer plays two audio recordings on what is health, from both knowledge systems
2. Lecturer asks the pre-service teachers to explain what health is from the two perspectives

**Stage 2:**

1. Reading an article written by the PSTs on the causes of infections

**Stage 3:**

1. Whole class discussion on what is health and what causes infections, led by a KH
2. Whole class discussion on understanding the causes of infections from both knowledge systems

**Stage 4:****Lecture Activity**

1. Compare and contrast the causes of infections from both an indigenous perspective and a Euro-Western perspective. You may use the table below.

	Knowledge perspective the cause is attributed to	
Cause of infection	Indigenous knowledge	Euro-Western knowledge

**Conclusion**

Whole class question and answer session on causes of infections from both knowledge systems.

Emphasise the need to respect other knowledge systems with a focus on embracing cultural diversity.

**Evaluation:** \_\_\_\_\_

Pre-service teachers believe that some knowledge rooted in Euro-Western and indigenous frameworks can be taught integratively. They assert that, where antibiotics are identified from a European-Western perspective, IK remedies must be incorporated. This reflects that pre-service teachers are keen to explore possibilities of engaging with both knowledge systems. This was reflected in the preceding lesson plan where both knowledge systems are accounted for. The lesson plan supports the need for a multicultural informed curriculum in which knowledge systems are connected as noted by Jacob et al. (2018). In this way, students are exposed to different views and understand a concept from multiple perspectives rather than a single perspective. The idea of inclusivity as suggested by PST3 is visible in the lesson plan where the cross-cutting themes cite respect, inclusivity, and equality as core values. The cross-cutting themes of this lesson plan are crucial when working towards decolonising the curriculum through indigenisation, because African indigenous knowledge was not recognised in the academy for years (Chika, 2019; Ezeanya-Esiobu et al., 2021; Kaya & Seleti, 2013; Ocholla, 2007).

The teaching emphasised in the lesson plan is integrative in nature. This means that different aspects of the same phenomenon are linked together and these aspects are not considered in opposition to each other (Carelse & Dykes, 2013). In this way pre-service teachers are given the opportunity to establish relationships between different knowledge systems.

The use of the KH as a pedagogue was highlighted both in the lesson plan and the interviews. For example PST5 suggested: “I propose we can call these elders to come and teach us in our colleges, and in turn we can visit these elders in the communities to learn more about indigenous knowledge of infectious diseases”. This supports the notion that the teacher/lecturer is only one

of diverse knowledge holders. This was also supported in the lesson plan where a KH was made part of the teaching human resource. This served to decentre people of Euro-Western descent as the sole knowers of science. Within this collaborative view, community expertise is tapped. Already PSTs revealed that they were transcending barriers which traditionally defined who could be deemed legitimate teachers based on the Euro-Western barometer of knowledge holders.

**Lesson Plan 02****Learning Area: Biology****Date** .....**Topic and Content:** Traditional ways of treating infections (influenza-related)**Resources/Apparatus:** Preserved herbal medicines, notepad, small axe (*Mbezo*), plastic bags for sample collection, mortar and pestle (*duri nemutswi*)**Cross cutting themes:** Cultural heritage**Objectives:**

- I. State signs and symptoms of influenza-related infections from an indigenous perspective.
- II. Identify herbs used in the communities to treat influenza-related infections.
- III. Observe how Karanga healers harvest, prepare, and administer herbal remedies in their places of practice
- IV. Describe ways of preserving the indigenous medication.

**Recognition of Prior Knowledge:**

KH to check on what the pre-service teachers know about infections that can be cured using traditional ways, through questioning.

**Introduction:**

Brainstorming whether pre-service teachers are aware of the ways used by indigenous people in managing infections.

**Lesson development:****Stage 1:**

1. Pre-service teachers list common infectious diseases they understand can be treated, using IK.
2. KH to give traditional names to the infections that are identified.

**Stage 2:**

1. Class discussion on common herbs used to treat infections
2. The KH to provide pre-service teachers with traditional plant names showing them collected specimens of the herbs available.

**Stage 3:**

1. Hands-on Field trip to identify common herbs following the Karanga ways of identification. Pre-service teachers would learn how to correctly identify herbal plants and how to use leaves and barks.
2. Observing the KH harvesting and preparing medicines. This is done mainly through observations and KH-led demonstrations.

**Stage 4:**

**Student Activity**

Pre-service teachers to complete a practical task based on the harvesting, preparation, and administration of the tasks

Medicinal Plant (Scientific and indigenous name and picture)	Karanga Uses	Medicine preparation (according to KH)	Ways of administering medicine (according to KH)	Medicine preservation (according to KH)

**Conclusion:**

Pre-service teachers to have a demonstration activity in groups on herbal plant harvesting, herbal medicine preparation, and administration.

**Evaluation:** \_\_\_\_\_

Pre-service teachers agreed with the idea that IK, which relates to Euro-Western knowledge, can be taught in different lessons. Their argument for teaching related concepts is based on the idea that IK is considered inferior and, in most cases, not understood by “outsiders” hence the need for adopting such kind of a lesson plan. For example, PST4 cited spiritualism as a concept that can never be understood within Euro-Western ideologies, but is a resourceful practice among KHis. It would therefore be beneficial to teach spiritualism-based knowledge of disease management as a separate entity.

Viewed from an indigenous perspective, the lesson plan reflects a pragmatic approach to learning. Learning is based on the principle of "hands-on minds-on" as hands-on inquiry dominates lesson development. The approach is supported by learning in contexts such as demonstration, experimentation, and field trips. All these promote learning rooted in understanding rather than memorisation.

The pre-service teachers believed that they should be given the freedom to engage in field trips during their education. They believed that knowledge is not only defined by what is embedded in the curriculum content, but that knowledge should also be a reflection of people's daily practices and culture Le Grange (2008), and Maguire and Young (2015). Pre-services teachers in my study believed that this knowledge can only be learned and understood through active engagement with the community, and these findings are similar to that of Mudaly (2018).

In relation to the second lesson plan, pre-service teachers proposed a project approach to assemblage and dissemination of knowledge. Although the third lesson plan is closely related to

the second lesson plan, I have separated them due to the uniqueness of the third approach, as shown in the third lesson plan submitted by the pre-service teachers.

The third lesson plan reflects a more community-based approach to knowledge construction. The lecturer merely creates a stimulus for learning to take place. The KHs become part of the conventional education system. Ignored, dormant and underutilised IK can be accessed, conceptualised and reshaped. Furthermore, this knowledge can be recorded and stored for future use in portfolios. It can be used to supplement the university library repository. Therefore, documentation of IK as outlined in this practical approach, is a way of valuing and preserving it and making it accessible to pre-service teachers.

The following lesson plan was designed by pre-service teachers outlining the third inclusion approach:

**Lesson Plan 03 (Mini-project)****Learning Area: Biology****Date .....****Topic and Content:** Mini-project: Karanga ways of treatment of infectious diseases**Resources/Apparatus:** Audio recorder, camera, razor blades, glue stick, small clay pot, A3 folio sheets**Cross cutting themes:** Environmental protection, respect for culture**Objectives:**

- I. Develop a deep understanding of herbs which can be used safely (Confirmed from the catalogue provided by the National Botanical Gardens) in treating infectious diseases.
- II. Develop sustainable harvesting techniques
- III. Acquire skills of preserving herbs.
- IV. Develop a portfolio of collected herbs that will be kept at a herbarium or herbal library at the university

**Recognition of Prior Knowledge:**

Pre-service teachers may be aware of the use of herbal remedies in managing infections, learnt from their homes

**Introduction:**

Lecturer initiates the project by asking the pre-service teachers if they know any KHS/herbalists in their home areas, and guides students on the ethical ways of conducting a mini project within an indigenous community.

**Project development:****Phase 1:**

1. Pre-service teachers to apply for ethical clearance from the university to conduct the project.
2. Pre-service teachers to seek permission to conduct research from community leadership
3. Pre-service teachers to seek informed consent of the KHs/herbalists to participate

**Phase 2:**

1. Pre-service teachers to engage KHs through dialogue on herbs and approaches used to treat infectious diseases  
Discussions are based on the following questions:
  - What herbs are recommended for use in treating common infections in your community?
  - How do you identify them?
  - How do you harvest these herbs? Can you show us how you harvest?
  - Can you demonstrate how you prepare and administer the herbal remedies?
  - Apart from herbs, what other thing/s do you use to promote good health in your area?
2. The KHs to participate in the dialogue.

**Phase 3:**

1. Field trip to identify different herbs, learn about harvesting approaches, develop preservation skills, and collect the different samples

**Phase 4:****Folio making**

Pre-service teachers to develop a folio having the following headings: name of plant in indigenous, picture of preserved sample, how is it harvested, preparation of the medicines, dosage, possible side effects.

This lesson plan proves that pre-service teachers are willing to go a step further in freeing themselves from the shackles of a monolithic curriculum. Again, the lesson plan reflects a pragmatically rooted approach to learning. In this plan, students are given the freedom to determine for themselves what they want to learn, and to develop ideas from a practical experience. They are given the freedom to use what they have learnt from KHs, and what they are experiencing in their university learning. They have the autonomy to construct meaning from their lived experiences. This method encourages active participation in learning and reinforces critical thinking relevant to solving community challenges collectively (Adeleye, 2017).

Lesson plan 3 reveals how a collaborative approach to knowledge construction can be developed. In this scenario the KHs become the source, while pre-service teachers are the discoverers who seek to tap into the knowledge of others, rather than being passive recipients of abstract knowledge that is beyond their reach and understanding, as is sometimes the case in the university setting (Plessis, 2021). Learning therefore becomes a social act not confined to the four walls (Arenas et al., 2012). Therefore, this allows pre-service teachers to generate culturally relevant knowledge, thus transforming the curriculum by making it more inclusive of African knowledge and practices.

In this approach knowledge construction is a collective effort that pays attention to respect and integration (indigenous knowledge is valued and made part of the curriculum), decolonisation (there is decentering of the Euro-Western base and recentring of the African indigenous knowledge base), and social justice (students and community members contribute to knowledge development which was previously the domain of Euro-Western scientists).

The collaborative approach resonates with calls to decolonise the university education

system through complicated curriculum conversations, by involving different stakeholders such as scholars, students, academic institutions and the general community (Le Grange, 2016; Pinar, 2011). In the same vein Mudaly (2018) advocates for the implementation of a curriculum that recognises IK holders as significant repositories of worthwhile information who can be part of the teaching process at university level.

Therefore, based on pre-service teachers' lesson plans and interviews data in particular should be engaged with, tapping from community practices and should integrate such practices into the curricula. Thus, tapping into the community as a repository of useful knowledge can enable the creation of an inclusive curriculum. It is crucial that researchers first understand the community, identify with the community, respect the community, explore areas that need to be uplifted, utilise resources in the community (both material and human), and respect the language and practices of the community. As a result such a university will not only produce certified graduates, but graduates who can adapt and are capable of bringing development to their communities. This is not development that comes with donations or with conditions attached that curtail the freedom of local participation. The curriculum of such an inclusive university leans heavily on the lived experiences of community members. The pedagogy reflects what is happening in the community. Such a university curriculum 'destroys' the four walls (classroom practices), reflected by a shift from everyday classroom practices to tapping into students' everyday experiences.

In general, pre-service teachers valued an inclusive, student-centered, and culturally relevant curriculum. They argued for pedagogical approaches that are collaborative and inclusive.

### *6.3.3 Challenges toward inclusion of IK content and pedagogy into the curriculum*

Pre-service teachers had a general understanding that IK is relevant, and they supported the inclusion of this knowledge in the Biology curriculum, as was evidenced by their feedback. .

However, they highlighted the existence of militating factors, discussed in the following excerpts, which were a response to the question: *What challenges do you think may be encountered when trying to include IK of infectious diseases into the Biology curriculum? And how do you think these challenges can be addressed?*

Table 6.5

*Challenges toward inclusion of IK: Views of pre-service teachers*

Participant	Response
PST1	When I read interview transcript from the KHs healers I realised that information on disease management is not easily shared by knowledge holders in the community. It is only known and kept by a few who may be traditional healers or community elders or the spiritually selected ones
PST2	The modern world is controlled by aspects of globalisation, capitalism, and urbanisation which all remove people especially the youth, from indigenous practices and they see indigenous knowledge as backward and inferior to urban practices.
PST3	Most universities in Africa cannot do curriculum change independently, rather they rely on external factors that in most cases drive the Euro-Western agenda. This can be because of lack of funding by local universities.
PST4	IK is considered primitive and old-fashioned by the younger generation. Some people are no longer interested in IK because of their religious beliefs for example Christianity, which does not believe in African traditional practices.
PST5	Traditional beliefs are seen as unholy by the Christians, so most people are ashamed to be associated with it. IK is not written down so it is a challenge to learn about it in schools or colleges. There is less scientific testing done on our herbs, this is why many people especially those believing in 'science' avoid it (IK) and why it is not used in clinics and taught in schools.

Pre-service teachers highlighted a number of militating factors against the inclusion of IK into the conventional university curriculum. The knowledge about healing using plant material for example, is not readily available as it is kept secret by a few divinely selected (PST4; PST1). This is substantiated in literature where healers are given the custodianship of

such knowledge (Sodi et al., 2011). This knowledge in most cases is not for public consumption, although the community benefits by way of consulting and getting help when they have health-related problems. There is a great risk of losing valuable knowledge in the event of death or loss of memory or ancestral disfavor of the KHS. Keeping IK as an asset to the divinely selected few, contributed to non-documentation of this knowledge for many years. This lacuna created by a lack of documented knowledge paved the way for colonisers to dismiss such knowledge practices.

The world we live in is defined by principles of modernisation, capitalism, globalisation, development and urbanisation. All these principles are reflected in the Euro-Western paradigm. Anything that does not identify with Euro-Western practices is deemed backward, non-scientific and at times labelled 'barbaric'. As such IK has been classified as backward (Adebisi, 2016; Prinsloo, 2020) and is therefore excluded from the curriculum. Many followers of the Christian faith regard IK as unholy and evil (Mokgobi, 2014). This is against the background that Africa as a continent was assimilated into Christianity during the colonial epoch. Prior to colonisation, IK defined the day to day operations of African communities (Mpofu, 2016). This dearth in the role of IK in contemporary society, is evidence of how colonisation caged the African mentality to the extent that Africans denounced their own religion, culture, and practices (Nyoni, 2017). Therefore, academics who claim to strive for epistemic justice could be well placed at the helm of campaigning for the inclusion of IK. Instead many academics are absorbed in academic achievements and progress rooted in the Euro-Western ideology (Connell, 2016). Most of these academics received a Euro-Western type of education that mentally uprooted them from the African context. Furthermore, their operational jobs require them to implement a Euro-Western type

of curriculum, in order to meet global and institutional needs. This fortifies the barrier to incorporating IK into the curriculum.

The youth have been identified by KHS and pre-service teachers as complicit in cultural slippage. In this regard FGIs with PSTS revealed the generational gap as one factor that opposes the resuscitation of IK in education. Due to a lack of documented reference material, indigenous knowledge almost remained static, and unavailable using technology in the 21<sup>st</sup> century. Euro-Western knowledge is readily available in both the electronic and print media, but IK is not. In other words, IKS failed to revamp itself in line with changes that were occurring globally. However, those items being incorporated within IK domains of managing infections are also being used by the Euro-Western world in producing bio-medical products (Amusan, 2017). In this regard Imran et al. (2021, p. 4) argued that “the corporate hijacking of food is the most important health hazard in this era; giant commercial enterprises are using intellectual property rights to patent indigenous medicinal plants, seeds, genetic resources, and traditional medicines”.

This quotation indicates that there is some elements of theft of indigenous people’s knowledge in different fields and this has been exacerbated by the commercial patenting by the commercial entrepreneurs. Scientists are increasingly vying for indigenous knowledge that has been developed over generations based on the characteristics of various plants for use in agriculture, medicine, and other fields. Biopiracy, or the stealing of biological material including plants, seeds, and DNA, is the outcome of this. Multinational corporations earn greatly from Africa's biodiversity, but critics claim that these riches are not distributed to the communities who discovered, preserved, and transmitted the knowledge. In this context, Ageh and Lall (2019) mention colonialism and the Scramble for Africa as factors that allowed western scientists and multinational pharmaceutical companies access to plant

resources for bioprospecting. They search in remote areas of Africa for "novel medications from exotic plants" in order to make money or obtain patent rights.

#### **6. 4 Chapter summary**

In this chapter findings related to research objectives two and three based on the pre-service teachers' research activities were presented. The chapter highlighted possibilities of epistemological interfacing between the two knowledge systems. The chapter discussed options for teaching IK and Western subjects concurrently or side by side. Assessments based on the two knowledge systems were shared in order to promote understanding rather than competition. The chapter also described how IK related to infectious diseases was documented, informed by interviews done with KHs. Most of this knowledge is within the IK domains of diagnosis, prevention and treatment, transmission, and education. Pre-service teachers were trained by me to carry out document analysis based on content discourse analysis. The Biology curriculum for pre-service teachers was analysed by myself and pre-service teachers, and knowledge related to infectious diseases was isolated and presented. Findings from FGIs revealed that knowledge regarding infectious diseases in terms of both the content and pedagogy, privileges the Euro-Western worldviews. After extensive engagements with pre-service teachers, the findings point to the need for knowledge democratisation in the university curriculum. Through their lesson plans, PSTs described possibilities for moving away from the conventional education that is decontextualized and abstract to the African students towards a curriculum that identifies with their lived experiences. In the chapter, a change in learning and teaching of the PSTs' Biology modules was envisaged by them, so that the modules become pragmatically relevant.

In the next chapter research findings are linked to the theoretical constructs of this study.

**CHAPTER 7****THEORETICAL CONSTRUCTIONS**

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## 7.1 Introduction

The motivation for this study was largely fueled by the political imperatives that underly university curricula in Africa in general, and at a university in Zimbabwe in particular. The major research questions were addressed by focusing on identifying indigenous knowledge (IK) related to management of infectious diseases within the Karanga community. I worked collaboratively with PSTs to explore whether and/or how IK is represented in the current Biology modules for PSTs, and the reasons for these. Finally, we explored possibilities for including IK into the Biology modules for pre-service teachers, from their perspectives. This was intended to listen to ‘voices from below’, to ‘learn from below’ about a culturally inclusive Biology teacher education.

I begin this chapter with a narration of how theoretical decolonial perspectives informed this study. Then a description of how the critical pedagogy that guided the current study, is presented. The chapter also outlines my theoretical perspectives that emanated from this study.

The literature review confirms that the concept of decolonisation/decoloniality of the curriculum is a complex, interwoven process. For example Le Grange (2021) and van Wyk and Higgs (2011) provoke scholars, students, and academics by asking us to consider whether we have African universities or universities in Africa, whether we have African curricula in universities, or whether we have imported curricula in African universities. These questions created spaces for the current study, to question the nature of the curriculum offered by one university in Zimbabwe, with a specific focus on Biology teacher education. From the literature review, it emerged that the curricula offered in most universities in Africa mirror Euro-Western ways of knowing. For example Du Plessis shared:

The education system continues to navigate a colonial legacy within the context of global shifts and societal changes. In South Africa many of the structural elements of the education system have remained unchanged. These colonial legacies and the subsequent effects of coloniality on South Africa are similar to those in other Southern African countries such as Zimbabwe from which this study was conducted. The effects of colonisation on South Africa's education system are still seen in the prevalence of centralisation, standardisation, and a system that perpetuates South Africa's existing class structure and access to quality education (2021, p.4).

In this context Le Grange explored the knowledge production spaces asking:

What and whose knowledge is circulated in journals....., what is silenced when the written word (in mainly English) as a form of representation is privileged, what might get lost when South African journals that are (potential) bearers of alternative ways of knowing, doing, being and becoming are devalued by a new funding formula (I think of a journal such as *Indilinga: African Journal of Indigenous Knowledge Systems*), what knowledge will form part of classroom/lecture conversations if publications appearing in journals listed on international databases are increasingly privileged? (2014, p. 6).

These questions trigger the quest for reflective thinking among scholars, students, academics, institutions, and education policy makers in order to transform the education system in Africa (Connell, 2014, p. 211). Connell (2014, p. 211) also mentions the importance of university rankings, getting published in high impact journals, the latter which are mainly from Euro-Western publishing houses, as part of the neoliberal agenda that universities subscribe to, and in doing so, entrench the "homogenous" (single) domain of knowledge. The sustenance of a particular "political economy of knowledge" by universities in the South, which privileges the metropole and cements the role of the periphery in research, is underscored (Connell, 2014, p. 211). In order to challenge the intellectual dependence by the South on the metropole centre, especially in the wake of neoliberal globalisation, Connell (2014) invites us to leverage the affordances of indigenous knowledge.

Debates on the nature of the curriculum have been ongoing from colonial to post-colonial eras (Yacob, 2020). Indications are that African people's knowledge is underrepresented and marginalised in the curricula. The main reason for the marginalisation of IK is attributed to it being produced by unscientific means (Santos, 2014). However, Naamwintome and Millar

(2015, p.1) argued that “African indigenous knowledge (AIK) is a body of knowledge just like Euro-Western and has been and is still being used for the well-being of a community”. In this regard a pertinent question had been raised, namely: “.....what lens can be used by decolonial scholars to articulate their niches in the world of science. One view is based on integration while the other view implies that African way of knowing is science (separate from the main stream but equal)” (Naamwintome & Millar, 2015, p.2).

## **7.2 Decolonial perspectives: From different ideologies to the current study**

Notions of decolonisation/decoloniality have roots in the current understanding that African people’s social, political, and economic activities are defined by coloniality which is a secondary form of colonialism (Ndlovu-Gatsheni, 2020). Ndlovu-Gatsheni highlighted the three interlocking aspects embedded in coloniality:

Coloniality of power, coloniality of knowledge, and coloniality of being. Coloniality of power relates to the current asymmetrical global power structure that is a consequence of modernisation, which has brought benefits to the West through imposing the slave trade, imperialism, colonialism and apartheid on the rest. Coloniality of knowledge relates to how the genesis of disciplines in the West resulted in epistemicides in the Global South and how Africa is now burdened with knowledge that is disempowering. Coloniality of being relates to how whiteness increased its ontological density to the extent that it now far exceeds that of blackness and how Descartes’s “I think, therefore, I am” morphed into “I conquer, therefore, I am” (2013, p.12).

The process of decolonisation should be viewed from different perspectives if the colonised are to be empowered socially, economically, and politically. Irrespective of coloniality some scholars argue that the colonised have accepted this Euro-Western domination and learnt to live with it (Odora-Hoppers, 2019).

A decolonial movement is therefore aimed at severing colonial umbilical connections of the black Africans (Ndlovu-Gatsheni, 2021). It is a movement that seeks social justice through epistemic reform (Shay & Peseta, 2016), cognitive liberation (Omanga, 2020), and erasure of

epistemic brainwashing propagated by education among indigenous people (Ekore & Larme-Abass, 2016).

Decoloniality/decolonisation has been perceived differently by different scholars. For instance Parashar and Schulz (2021) described decoloniality as transforming the mode of thinking, anticolonial movement, erasure of power imbalances, and as a self-reflective process accepting reality as embedded in one's true life. Parashar and Schulz (2021) in outlining the above four tenets aimed at advancing decoloniality, question why the colonised feel comfortable with coloniality, how the colonised react to decolonial opportunities, what knowledge is acknowledged, rewarded and promoted, what knowledge is not rewarded, is discarded and discredited, whether the colonised mentally and spiritually accept the colonial guard in their lives and stories, and whether they accept that the colonial guard is now part of their lives. Finally, the role of decoloniality in epistemological and ontological transformation is questioned. These questions resonate with other decolonial scholars. For example Le Grange (2014) and Apple (2018) questioned what knowledge is worthy of inclusion in the curriculum.

Perspectives of decolonisation of the curriculum vary from scholar to scholar, with some common converging ideas among different scholars. Key findings from reviewing literature include the overwhelming evidence that university curricula are foreign to the students who study it, that most curricula documents are agents of reproducing Euro-Western ideologies, and that there is a need to dismantle the hegemony of the Euro-Western cannon (Heleta, 2016b). The significant question is what approach(es) can be used to decolonise the curriculum. There are several theoretical contributions from scholars with regard to the role of the university as an agent of social reconstruction and change, for example, Esmaili et al., (2015) (see Chapter 2), and Chomsky who highlighted that:

The major contribution that a university can make to a free society is by preserving its independence as an institution committed to the free exchange of ideas, to critical analysis, to experimentation, to exploration of a wide range of ideas and values, to the study of the consequences of social action or scientific progress and the evaluation of these consequences in terms of values that are themselves subject to careful scrutiny (2003, p. 278).

As stated, Chilisa (2012) proposed five phases to decolonise a curriculum, namely, rediscovery and recovery, mourning, dreaming, commitment, and action (for details see Chapter 2). Le Grange (2016) argued that decolonial methodologies must be rooted in relational accountability, respectful representation, reciprocal appropriation, and rights and regulation (for detail see Chapter 2). For Le Grange (2016) decolonising the curriculum can entail accommodating indigenous peoples and their cultures, through a three- cycle approach, namely, cycle of ancestral sciences formation (community learning), cycle of learning of Western sciences (learning to unlearn and re-learn), and cycle of learning of inter-culturality (learning to unlearn, re-learn and progress to active learning) (for details see Chapter 2). The learning to unlearn and re-learn has been viewed as deschooling and reschooling in the academic and scholarship landscapes (Naamwintome & Millar, 2015). Hauser et al., (2009) proposed an appropriate indigenised curriculum, informed by incorporating relevant IK into the curriculum. In the same vein Le Grange (2018) alluded to the principles of deconstructing and decentering of the colonial knowledge system when thinking about university curricula. Decolonisation of the curriculum has also been linked to the principles of Africanisation of the university including epistemological access by indigenous communities (Le Grange, 2014). Epistemological access is not only rooted in the distribution of knowledge within the Euro-Western canon, but must also provide access to alternative ways of knowing through recognising indigenous ways of knowing (Le Grange, 2014). Le Grange (2014) argued that Africanisation may entail radical rethinking of disciplines, and incorporation of IK through

invigorating lines of thought from points of rupture in existing discourses and incorporating IK through transdisciplinary knowledge. Le Grange (2012) proposed a shift from the current education system (which is propped up by integrated world capitalism), to one which is more localised (while not neglecting the global worldview) and is deterritorialised through harnessing the *Ubuntu* philosophy. Within the principles of *Ubuntu* Le Grange (2012) proposed the need for relocalisation and reterritorialisation as a means of reclaiming local ways of knowing.

Le Grange (2021) proposed *Ubuntu* as a form of decolonisation. The main principles behind *Ubuntu* lie on ideas of unlearning and relearning, and the Africanisation of the curriculum. In addition Le Grange (2021) argued that the decolonisation of university curriculum is an ongoing process and is far from being realised. This therefore means that much has to be done in order to achieve epistemic freedom. Le Grange (2021) proposed that decolonisation should be a life long struggle to rid the self and institutions from the fetters of coloniality. The argument proffered by Le Grange (2021) is that the *Ubuntu* provides one form of decolonisation that presents opportunities for disrupting dominant approaches to curriculum configured in the Euro-Western hegemony.

Pinar (2004, p. 36-37) outlines *currere*'s four stages for decolonising the curriculum.

1. The regressive step-enables the individual to focus on how he/she has actively taken up (de)colonial discourses in their life. It entails a moment in self-criticism and depicts the beginning of the individual's efforts to rid the self from the shackles of coloniality.
2. The progressive step-the individual imagines a future that is more just, more democratic, more sustainable, authentically postcolonial (decolonised), for example.
3. The analytical step-the individual detaches him/herself from the past and future and analyses how the past, future and the present are imbricated in one another. By distancing himself/herself from the past and future the individual is able to experience a liberated from thoughts that are colonising.

4. The synthetical step-the individual re-enters the present with a renewed sense of self, able to see the wholeness of past, present and future, and asks what does this mean and what can I do? This is the moment where the individual can join others in collective action to transform the present so as to make possible a different future.

An interesting connection can be made among the steps outlined by Pinar (above) and those proposed by Chilisa (2012) to decolonise the curriculum. Pinar's regressive step is similar to Chilisa's rediscovery and recovery, where scholars look back into their own knowledge repositories. The progressive step presented by Pinar is similar to Chilisa's dreaming, where one re-imagines future possibilities towards a just curriculum. The analytical step presented by Pinar has elements which can match Chilisa's commitment stage, where scholars commit themselves to transform the curriculum. Pinar's synthetic step involves collective action, as does Chilisa's action step.

This study leveraged on ideas from Pinar as well as do the works of Chilisa (2012), Le Grange (2012; 2014; 2016; 2021), and Ndlovu-Gatsheni (2020; 2021). Le Grange (2021) observed that there is dissonance between the lived experiences of the students, and the curricula in universities. Furthermore, Le Grange (2021) asserted that university students are taught science, whose origin they do not question.

In my study I leaned on the ideas of Le Grange (2021, p. 7) based on the need for students to develop philosophical lenses to "critique manifestation of ideologies in social practices such as curriculum knowledge and pedagogy". Through capacity development of pre-service teachers to critique that which is normalised in the curriculum, they may start questioning the dominance of modern western science. This is in line with Le Grange and Aikenhead's (2017) assertions that specifically challenged the normalised narratives that the colonisers and their knowledge systems are superior to other knowledges (those of the colonised) and their cultures.

Pre-service teachers who participated in my study were instrumental in steering the decolonial agenda through capacity development and action. Their involvement in this decolonial effort was premised on the understanding that they are the future curriculum developers, potential policy planners, and future curriculum implementers. Furthermore, I viewed pre-service teachers as the first link towards epistemic decolonisation including disruption of cognitive colonialism.

As I alluded to earlier through my experience (as a teacher educator), I noticed that universities have positioned students (pre-service teachers) as passive recipients of the knowledge set for them by their lecturers. This has alienated pre-service teachers who have become non-participants in curriculum discourses. In other words they are not part of the university curriculum dialogue but are viewed as clients who receive education without question. This was noted by Le Grange (2021) who outlined how, during his undergraduate years, students rejected the position of passive recipients and clashed with authorities over curriculum-related matters. Recently, in 2015/2016 South Africa also witnessed a wave of student uprisings for the dismantling of the Euro-Western hegemony under the auspices of #RhodesMustFall and #FeesMustFall. These discourses reverberated among Global South countries, including Zimbabwe, where my study was located.

In this study pre-service teachers were trained through a reflective approach that was aimed at challenging them to be critical thinkers, in keeping with what Le Grange (2021) referred to as the development of philosophical goggles, so that they start to question the nature of the curriculum they learn at universities. In the next section I narrate how the pre-service teachers were empowered to become critical thinkers and decolonial agents using the *currere* principles, while leveraging other decolonial principles proposed by Chilisa (2012).

*Currere* as a form of decolonising the curriculum begins with the regression step. In this study pre-service teachers were exposed to IK of managing infections from the Karanga healers' perspectives. This was done through sharing interview transcripts and photos (from contact with the KHs), with pre-service teachers. Although this stage was for the pre-service teachers to familiarise themselves with the indigenous knowledge, it also served as a point of departure from which they could question their identity and cultural affiliation. This resonates with Chilisa's (2012) rediscovery and recovery approach to curriculum decolonisation. During this stage the pre-service teachers were also trained on document analysis using the/a critical discourse analysis. Critical discourse analysis challenges people to reflect on the discourses that characterise their everyday life. Pre-service teachers were trained to reflect on; the nature of the Biology curriculum regarding infectious diseases, how IK is being represented in these modules, and the nature of IK in managing infections. The whole process was designed to trigger a reflective mind in pre-service teachers. Le Grange (2021) argued that a regressive step challenges the pre-service teachers to question the position of their daily home practices and the place of their culture and practices in the four Biology modules. The regression step according to Le Grange (2021) motivates students (pre-service teachers) to question aspects such as language being spoken home, and whether this language is a language of instruction in classroom discourses). The regressive step was useful in challenging pre-service teachers to find out whether and how their communities are interpellated into the current curriculum. Engaging students with the critical discourse analysis unmasked how their cultural, religious, political, and social values are excluded in the university curriculum. Critical discourse analysis in the current study helped to develop the capacity of pre-service teachers to critique the curriculum. Thus pre-service teachers developed critical analytic skills to heighten consciousness of how some knowledge systems were privileged or underrepresented in the current curriculum. This, according to Le Grange

(2016), would lead to promoting ecological consciousness on the part of the pre-service teachers, and hence being more acutely conscious of the dissonance or resonance between lived experiences of the students and the university curriculum. This would create a shift from the current curriculum discourses in which students (pre-service teachers) do not question the nature of the university curriculum, but receive it as a fixed package which is prepared for them, towards challenging the hegemonic paradigms, the latter which allow for the Global North to benefit maximally from the knowledge economy.

The current study also applied the progressive approach to decolonising the Biology modules for pre-service teachers. The progressive approach is based on the understanding that after regressive engagement, pre-services teachers have been challenged to consider the need for the dawn of a new epistemic shift. This stimulates imagining and dreaming (Chilisa, 2012) about what can be included into or excluded from their modules. This is the most critical step in this study because it positions pre-service teachers as central players (agents of curriculum change) in determining what IK can be included into the curriculum and how this IK can be included. This step is also important because it has the potential to eradicate different forms of coloniality that exist and perpetuated by the education system in Africa (Le Grange, 2021). The pre-service teachers were involved in focus group interviews in which they were expected to outline the possible benefits of including IK into their Biology modules. They were supported to think about how IK could be included in teacher education modules. This in a way, created spaces where various knowledges are placed on an eminent place so that they can be equitably compared (Le Grange, 2021). Aligned to this view Le Grange (2021) argued that presenting IK within the university curriculum creates an African university instead of a university in Africa, thus dreaming of an African curriculum, as opposed to a curriculum in Africa . In addition, Le Grange's (2021, p.22) proposed "...attuning the university curriculum to the heartbeat of Africa and reflects the rich diversity

of the knowledges and living experiences of Africa”, shows a vision of curriculum decolonisation. This idea is supported as it is intended to initiate a dreaming about epistemic transformation and commitment (Chilisa, 2012) on the part of the students (pre-service teachers). The idea of including IK into PSTs modules also challenged pre-service teachers to imagine what the future of the curriculum can be like. This is in keeping with an analytic step proposed by Pinar (2004) and Le Grange (2021). This step focuses on the nature of the futuristic curriculum, based on the perspective that the people yet to come are not the future people but are the people here and now, who are in the process of moulding a just tomorrow (Le Grange, 2021). All these approaches combined aimed at developing epistemic reflectivity on the part of the pre-service teachers.

Through PSTs capacity development that aimed to dismantle the cognitive and epistemic shackles which created a monolithic curriculum, my study introduced the PSTs to action oriented transformation (Chilisa, 2012). During this phase pre-service teachers were asked to produce lesson plans to find out the content and pedagogy they would have preferred to have informed their learning of Biology modules. This exposed them, to a small extent, to Le Grange’s (2016) three cycles, namely:

- (1) Cycle in ancestral science (doing together and learning to learn) - this involves working with IK and Euro-Western sciences simultaneously to produce culturally-inclusive lesson plans.
- (2) The cycle in Western sciences (unlearning then relearning) - in this case training pre-service teachers to be reflective thinkers through critical discourse analysis formed the basis for the unlearning and relearning processes (Le Grange, 2016).
- (3) Cycle of inter-culturality - includes unlearning and relearning, and moving from learning to understanding (Le Grange, 2016). Pre-service teachers worked toward being producers and

implementers of a just curriculum, as a way towards a just future, where sovereignty of the Africans and their knowledges will be valued.

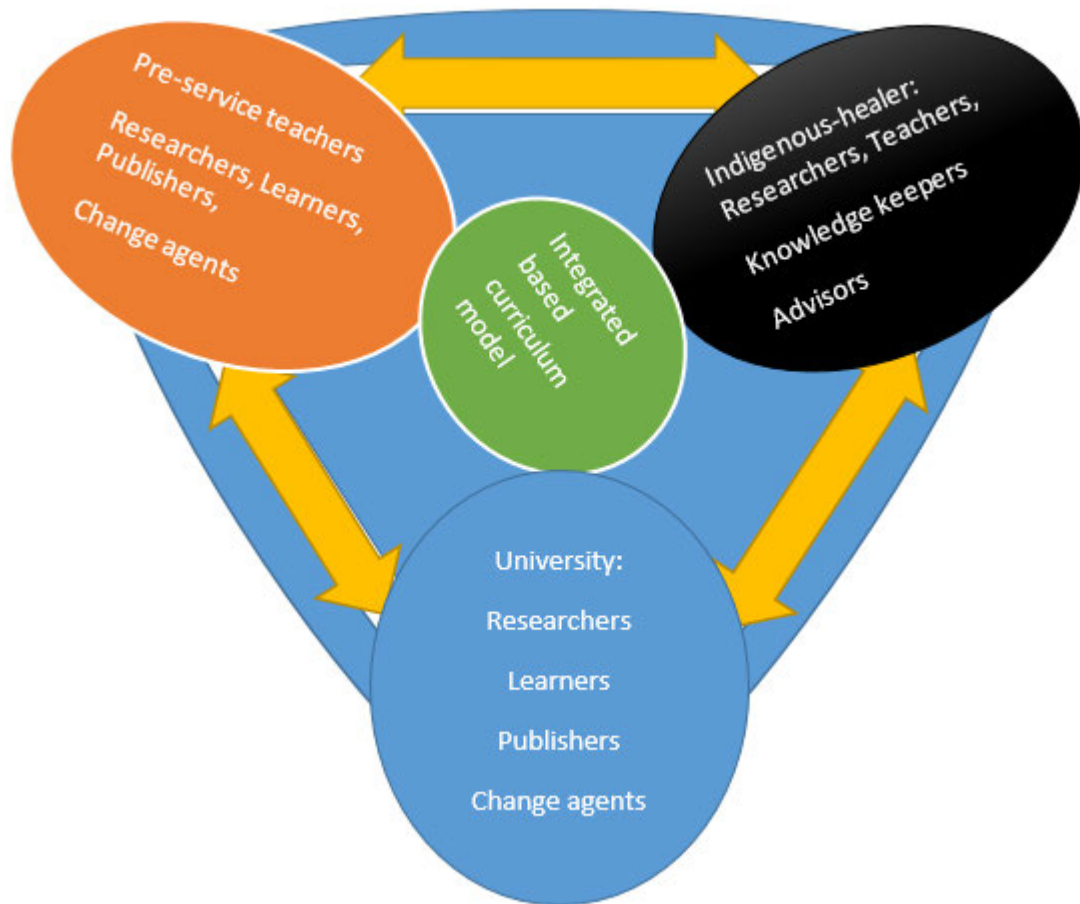
The above approaches used in this study contributed to some extent, to the existing body of knowledge. This is described in the paragraphs that follow.

The study proposed a university curriculum that is integrative, by tapping into indigenous knowledge and practices. At the same time this study advanced the idea of complicated curriculum conversations (Le Grange, 2016; Pinar, 2012) in which a just curriculum is inclusive of the ideas that come from different participants [namely, students (pre-service teachers), indigenous knowledge holders, and the university community] In this case the university (institutional) voice was tapped from the analysis of the four Biology modules for pre-service teachers to find out how knowledge about infectious diseases is (re)presented.

The current study is premised on the need to create a curriculum that is ecologically conscious - a curriculum that is not separate from the nature and culture of the people for whom it was designed. In this study I proposed an integrative based curriculum model as an initiative of different participants.

### **Figure 7.1**

*Stakeholders within an integrative based curriculum model*



The integrative based curriculum model is designed on the general understanding that knowledge is not a privilege of one knowledge system but can be understood from multiple perspectives. According to this model knowledge is collaboratively produced by the university, indigenous communities, and student communities. The different stakeholders bring forward different worldviews and establish a common knowledge system that includes a hybrid of knowledge content, pedagogical approaches, values, and practices. Thus there is an interconnectedness of the university, indigenous communities, and student communities. In this way a holistic and inclusive curriculum can manifest.

Waghid and Hibbert (2018) suggested democratising the academic space by promoting equity, emancipation, and recognition of diversity of thought and practices. This is supported by Mathebula (2018), who called on the university to critically appropriate its curriculum and

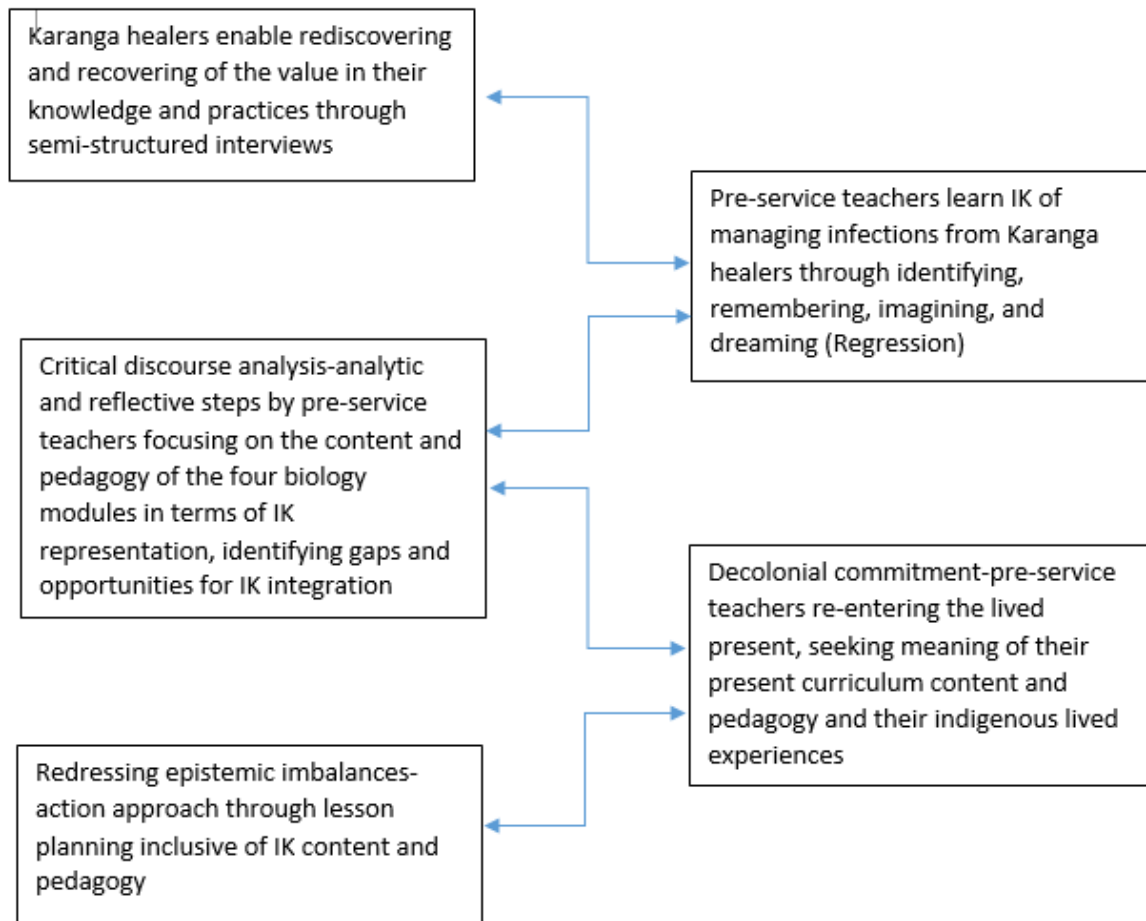
reframe it in terms of Afrocentrism. In this way what has been structurally and systematically marginalised in the academy, is redefined. This gives rise to the concept of reconstructing knowledge systems from a cultural perspective, which can be only be advanced by creating spaces for critical thinking.

In the struggle to decolonise the curriculum, Mbembe (2016) points to the need for a curriculum that is epistemologically diverse. In this regard, the curriculum must be globally and locally (glocally) relevant (Calitz, 2018; Lockett, 2016). Such a curriculum can only be achieved if universities engage in lengthy conversations and engagements with all stakeholders. These conversations can drive transformative epistemology (Mudaly, 2018). Accordingly, there is a need to encourage mandatory participation that respects the feelings and experiences of all stakeholders (Waghid & Hibbert, 2018). In other words, African values need to be central to the curriculum. This is a departure from the current one-dimensional structure of the curriculum.

The integrative based curriculum model gives a voice to the voiceless indigenous communities, including students from this community. In this model both the students and indigenous communities are considered valuable entities from which knowledge can be generated and integrated into the curriculum. Likewise, the university community is challenged to tap into community practices in order to develop with a curriculum that is representative of different worldviews.

Capacitating pre-service teachers as agents of curriculum change involved them being introduced into principles of rediscovery, reconstruction, decentering, recentering, and reconceptualisation of the curriculum.

The schematic diagram below shows a micro-movements towards a decolonial scheme that was used in this study.

**Figure 7.2***Decolonial scheme for this study*

The study applied a bottom-up approach to decolonising the Biology modules for pre-service teachers. In fact, the study equipped PSTs with the skills to be critical thinkers and to challenge the current injustices that characterise the university curriculum. Instead of asking lecturers how lectures can be rendered more culturally inclusive, a deliberate choice of student participants was made to explore the curriculum. The idea was to learn from students who emerge from communities where indigenous practices are visible and valued.

As the study findings were informed by an array of perspectives captured in decolonial literature, it contributed toward having the voices of the marginalised and colonised indigenous Karanga healers, being heard in curriculum discourses. This in a way is

emancipatory, for the colonised. The study further unpacked the potential of pre-service teachers as agents of change. The role played by pre-service teachers was vital, as they initiated a reflective path in decolonisation of the curriculum discourses. The pre-service teachers played both a reactive and proactive role in supporting restorative justice. They were critically reactive in establishing content and pedagogy of the curriculum, relative to content and pedagogical skills. PSTs were proactive in the discovery and recovery of IK in managing infections, and initiated a restorative agenda in which this IK can be included in their Biology modules. Thus, they remind the academic world that IK, similar to the Euro-Western body of knowledge, offers science that is worthy of recognition. In fact IK has a strong content base alongside vibrant and holistic pedagogies that do not only focus on success in examinations or getting certified for employment, but prepares students for survival in their communities.

### **7.3 Advancing decoloniality: Leveraging affordances of critical pedagogy**

The underlying principle of decoloniality is the elimination of the social inequalities that characterise for example, the education sector. Proponents of decolonisation yearn to give the most disadvantaged communities enough space and opportunities to free themselves from centuries of oppression. This brings critical pedagogy, based on the principles of critical theory, to the forefront. McLaren defines critical pedagogy (CP) as follows:

Critical pedagogy is a way of thinking about, negotiating and changing the relationship between teaching, knowledge production, the institutional structure of the school and the social and material relations of the wider community, society and nation or state (1998, p.45).

McKernan described critical pedagogy as follows:

Critical pedagogy is a movement that designs teaching and learning relationships so that students can gain critical self- and social-awareness and appropriately confront oppressive forces. This idea is central to Freire's notion of "becoming aware" or developing a personal critical consciousness (2013, p.425).

The two definitions reveal that critical pedagogy focuses on the need to create a just society in which the academic structure is connected with the larger society. The main focus of

critical pedagogy in this study is on empowering the voiceless, especially students and community elders. Empowerment in this case can take various forms, but most importantly, students should not be exposed to the "banking concept of education" (Freire, 2016, p.3 ) that is familiar today. Instead, these students should be equipped with critical thinking skills to transform their communities and challenge the power matrices that continue to demonise their communities (Zembylas, 2013). This challenges the monopolisation of economic, political, and cultural space by one dominant knowledge system (Euro-Western).

Critical pedagogy is also based on the need to connect the classroom to the community (Ali & Sajed, 2014; Gurn, 2011). In this way, students are not made objects of curriculum discourses, but are challenged to initiate change that aims to liberate the colonised.

The success of this approach is that students gain critical thinking skills, after which they come to explore and understand their society and its shortcomings, leading to transformative action (Abraham, 2014). In this case, CP within the decolonial discourse is about engaging students as active learners (Uddin, 2019). These students are then challenged to use their skills to liberate poor and oppressed communities (Kaya & Kaya, 2017).

The current study made it clear that decoloniality can only be a success if protracted conversations with different stakeholders are engaged in. The first connecting point for this is to challenge power hierarchies that shape the academy, and are normalised. As part of the oppressed, pre-service teachers were given the space to challenge oppressive social conditions and thus creatively contribute to change for the better. The bottom-up decolonial approach, complemented by critical pedagogy, developed into a more vigorous and practical approach to curriculum transformation and decolonisation, championed by pre-service teachers.

Within critical pedagogy this study considered perspectives of de Sousa Santos (2014), who argued that bringing IK into education is the best approach to counter the dominance of

knowledge from the Euro-Western worldview. In this regard, Misiaszek (2021) raised the following important questions for curriculum redesign:

1. *What do people learn?* The narrative was explored in this study by determining the content and pedagogy of four Biology modules for pre-service teachers and finding out what indigenous knowledge of infection management the KHs have. From this study, it was found that the four modules were rooted in the Euro-Western perspective of knowledge, while indigenous knowledge was experiential and, in most cases, defined from both the spiritual and physical worlds. These considerations show a dissonance between the two knowledge systems, which need not be an obstacle to the development of a pluralistic education system.

2. *How do people learn?* To answer this question, the pedagogical structures within the Biology curriculum for pre-service teachers, and interactions with KHs were examined to determine how their knowledge is passed from knowledge holders to the general community and from generation to generation.

3. *What do people do with this knowledge?* Again, the document analysis of the four modules and the interactions with KHs revealed that the established education system provides for specific careers into which graduates are channelled, while the knowledge of KHs is holistic and is for survival rather than service.

#### **7.4 Chapter summary**

The chapter began by outlining the focal narrative of the current study, which is located within the decolonial framework. This chapter linked the theoretical conceptualisation of decolonisation of the curriculum with the current study's main objectives. In the chapter the proposed participants for the development of an integrative based model of a curriculum, were distinguished. Furthermore, possible roles of these participants within the context of developing an integrative curriculum were outlined. A thick description of an integrative

based model of a curriculum, and how this can be achieved by promoting critical thinking among university students, was provided. Finally, ways in which the current study leveraged tenets of critical pedagogy in advancing decoloniality were presented.

In the next chapter (Chapter eight), a summary of each of the chapters in this study is provided. A summary of the research findings, research implications, concluding remarks are also outlined in this chapter.

**CHAPTER 8****SUMMATION, RECOMMENDATIONS AND CONCLUSION**

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## **8.1 Introduction**

In this concluding chapter, I present a summary of all the preceding chapters in the study. A summary of the key findings of this study, relative to the study objective are also outlined here.

The main objectives were to:

- (1) explore indigenous knowledge of infectious disease management,
- (2) explore how knowledge of infectious disease is represented in the Biology teacher curriculum, and
- (3) to explore how indigenous knowledge of infectious disease can be incorporated into the Biology teacher curriculum.

## **8.2 Summary of chapters**

### **Chapter one**

Chapter one presented the introduction of this study which dealt with ways to transform teacher education curricula at a university in Zimbabwe, using a decolonial lens. The background information about what perspectives inform disease management among African indigenous communities, was included. Generally, Africans depend on both the Euro-Western biomedical perspective and their indigenous knowledge for their primary health care.

The chapter also outlined the purpose of the study, which involved identifying IK of disease management practised by the KHS, and how this knowledge could be incorporated into the current Biology modules for pre-service teachers. The chapter presented the research objectives and research questions. The rationale of the study was also outlined as having been

informed by my personal experience as a black African of Karanga origin, the persistent marginalisation of IK of black Africans, and my professional experience in which I see colonialism being perpetuated in teacher education by, among others, the normalised epistemic silencing of IK in teacher training. This opening chapter also presented the significance of the study, mainly targeting education policy makers to critically examine the ideological orientation of educational policies that inform higher education.

## **Chapter two**

The chapter outlined the study's theoretical framework informed by decolonial, social reconstruction, and social transformation theories. A thick description of each theory was provided in this chapter. The intersection of the three theories within the critical paradigm was detailed. Finally, the justification of the three theories to guide the current study toward arguing for teacher education modules which reflect epistemological and ontological pluralism, was presented.

## **Chapter 3**

This chapter presented a critical review of literature related to this study. A thick description of indigenous knowledge in general, and indigenous knowledge of infectious diseases, was presented. Key concepts such as 'curriculum' were unpacked. In an attempt to contextualise this study, the chapter also described how Zimbabwe in particular and Africa in general, made efforts toward just curricula from colonial to post-colonial epochs.

## **Chapter four**

In this chapter the research methodology that guided the study was outlined. The qualitative methodological framework and the paradigmatic orientation (critical paradigm) were argued for. The context (rural community setting and institutional/university setting), the research

approach (qualitative), and the research design (participatory method) for this study, were justified. Purposive sampling was explained and details about sample composition and size were furnished. The data generation process that informed this study, was presented. This chapter also outlined the capacity development of pre-service teachers in critical discourse analysis. Furthermore, the choice of thematic analysis was argued for, and how it was used in this study was detailed. The chapter also outlined how issues of trustworthiness were addressed, and the limitations of the current study were declared.

### **Chapter five**

The chapter presented the major findings based on the first research objective. The data generated in this chapter evolved from semi-structured interviews with ten KHs. The main focus of research objective one was to identify IK of infectious diseases, practised by the Karanga people.

### **Chapter six**

Findings in lieu of research objectives two and three were presented in this chapter. Firstly, the chapter presented data generated through document analysis of the four modules for pre-service teachers. The chief focus was on establishing the epistemological orientation in terms of the content and pedagogy which was privileged in selected teacher education modules.

General information about the Biology curriculum for PSTs in terms of who produced the document, what is the target audience for the document, when was it produced, and what are the aims and objectives of the document, was furnished.

Secondly the findings for research objective three were presented. This objective aimed to establish how IK of disease management among the Karanga, can be included into the Biology modules for pre-service teachers. Data for research objective three was generated

through focus group interviews with pre-service teachers, and document analysis of three lesson plans produced by the pre-service teachers.

## **Chapter seven**

This chapter presented the current study's theoretical construction, informed by existing decolonial theories. Chapter seven also highlighted how different decolonial perspectives moulded this study. The theoretical contribution based on the self-generated, integrative based curriculum model and decolonial schematic diagram that guided this study, were presented. This chapter elucidated how the current study advanced decoloniality based on the principles of critical pedagogy.

### **8.3 Summary of findings from Karanga healers**

Research question one: *What is the Karanga indigenous knowledge associated with infectious diseases?*

Individual interviews with KHs revealed that in general, KHs possess rich information on infectious diseases. From the Karanga point of view, most infections are related to the spiritual world and in specific cases, as punishment for the injustice done by the living to the dead. From another perspective, ancestral spirits may withdraw their spiritual protection and expose humans to witchcraft. According to this view, the living rely on the grace of their ancestors to protect them from misfortune or contagion. In addition, the KHs believe that infections can be transmitted by wind, water, insect bites, and small animals. In some ways, this is similar to the European-Western view, where certain infections are transmitted by vectors.

The dominance of the spiritual world is also underscored by the fact that sick people are referred to spiritual healers for diagnosis, healing, and cleansing. KHs use their experience

and wisdom to make diagnoses. For example, they can find out what kind of infection a patient is suffering from, through consultations and physical examinations.

Karanga healers possess a vast repository of IK, which they use to prevent and treat infections. These practices range from the use of herbal medicines which can be taken as preventive or curative measures. These herbal medicines are prepared and administered in different ways. For example some herbal medicines can be taken orally or through smoking. Karanga healers use different medicinal herbs and plants [e.g. *Mufandichimuka* (*Myrothamnus flabellifolius*), *Zumbani* (*Lippia javanica*), *Muruguru* (*Carissa bispinosa*), *Mubvumira* (*Kirkia acuminata*), *Chifumuro*, *Mulemoni* (*Citrus limon*), *Muonde* (*Ficus sycomorus*), *Mususu* (*Terminalia sericea*), *Musekesa* (*Piliostigma thonningii*), *Mukomberwa* (*Crossopteryx febrifuga Benth*), *Mutsubvu* (*Vitex payos*) and *Mugamutiri* (*Eucalyptus camaldulensis*)] for maintaining good health. Karanga healers promote good health through eating healthy traditional foods. These traditional foods can be indigenous fruits [e.g. *Nhunguru* (*Flacourtia indica*), *Nhengeri* (*Ximenia caffra*) and *Maroro* (*Annona senegalensis*)] or indigenous cereals. Social behaviours and good health habits were also mentioned important in promoting good health in the community. Social behaviours included not sharing clothing and isolation of the sick from the healthy ones. Karanga healers' wisdom lies not only in knowing the plants, but also in promoting sustainable harvesting, preparation, administration, and preservation methods. In order to avoid overharvesting that may result in the extinction of medicinal plants KHs healers remove the parts of plant they use and do not cut off the whole plant. In the case of removing barks they only cut the small portion for use. Karanga healers also preserve some of their medicinal herbs through drying them. Most of the medicinal plants mentioned have been shown to have some pharmacological significance. In this context, Trinos and Mudaly (2020) argue that the presence of numerous

pharmacological properties in herbal plants, is encouraging for the control of existing and emerging infections.

Among the Karanga people, the ambit of knowledge is reserved for a few divinely chosen individuals (usually KHs) who have the ability to speak with the supernatural world. They act as intermediaries between the living and the dead. This knowledge is then passed on through songs, games, dances and storytelling, which are part of the teaching methods. In addition; practical field trips, direct observation of plants, apprenticeship, demonstration of sustainable harvesting methods, and hands-on participation in the preparation of medicines, are favoured as effective teaching methods. KHs do not have written records, so they store their knowledge in memory. In most cases, the storage of such knowledge rested with the elders or sages of the community. They bore the responsibility of ensuring that this knowledge was passed down from generation to generation. Bruchac (2014) highlighted that traditional elders are afforded considerable respect in their home communities; in the academy, because they are the custodians of cultural values. Overall, infections are viewed holistically among the Karanga. Shoko (2007) emphasised that the Karanga relies on both their physical surroundings and the spiritual world for the management of infections, which lends credence to this.

#### **8.4 Summary of findings from analysis of the Biology modules**

Research question two: *To what extent is knowledge of infectious diseases presented in the Biology teacher education curriculum? Why is this the case?*

Four modules for pre-service teachers were analysed. In terms of objectives and target occupations, the modules are far from serving the interests of indigenous people. Rather, the goal with which these modules are associated, is rooted in the promotion of scientific research in the biological field. Analysis of the modules reflected a lack of policy

implementation to promote decolonisation through indigenisation. Mpofu (2016) lamented the unwillingness of policy makers to promote IK in science education. In terms of career prospects, the modules prepare graduates to be service providers to industries that do not align with their cultural and social values. Basically, the modules do not value IK and do not promoting relevance and contextual learning for community development.

In terms of content knowledge about causes, diagnosis, prevention, and treatment PSTS found that Euro-Western worldviews dominated the curriculum for the modules. For example, diagnosis is based on clinical analysis, which is removed from the worldview of IK. It is important to note that there is some overlap in perspectives on pathogens; for example, infections can be transmitted by insects. Although the principles of the two worldviews are not the same, there is some form of commonality here. This also applies to the prevention techniques that are part of good health practices in both IK and the European-Western worldview for example the use of plant herbs to prevent and cure infections from an African perspectives is viewed as resonating with the Euro-Western pharmacological extraction of plant chemicals for medication (White, 2015).

### **8.5 Inclusion approaches: Dreams of pre-service teachers**

Research question three: *How can indigenous knowledge of infectious diseases, be incorporated into the Biology teacher education curriculum?*

All pre-service teachers agreed that IK on infectious diseases should be included in their modules. Their arguments were mainly based on the need to decolonise the current modules, to make science education relevant to the development of their communities, and to respect IK and indigenous communities. In this context, they were unanimous that IK should be part of the four modules based on diagnosis, causes of infection, treatment and prevention, and IK pedagogical approaches.

Pre-service teachers suggested an integrative approach to achieve these aims. In this approach, related IK and Euro-Western concepts are taught side by side. KHs can be invited or visited as needed, during the learning process. In this way, one system of knowledge is not favoured over the other. Students become exposed to the different worldviews simultaneously so that they perceive the world from a multi-perspective view. Their perception is not dominated by one worldview. This forms the basis for respect of different cultures and prepares students to adapt to different knowledge systems.

Pre-service teachers proposed different teaching strategies for example, KHs can be invited or consulted. This is a good response to the call of many scholars (Mudaly, 2018; Govender et al., 2018) who questioned the exclusion of such community sages in the creation and dissemination of knowledge. Pragmatic pedagogies such as field trips, demonstrations, and apprenticeships were emphasised. Students were seen as the key stakeholders in shaping the curriculum. This challenges the current view that students are passive recipients of knowledge. In this regard, a bottom-up approach to curriculum dynamics, is advocated (Cuadro, 2022).

## **8.6 Study implications for the curriculum**

My research revealed that the four Biology modules' content and pedagogy are silent on AIK for controlling infections. These findings support the notion that the African educational system is framed from a Euro-Western perspective (Mosweunyane, 2013). According to this point of view, Ndlovu-Gatsheni (2018) is concerned about what he termed the overrepresentation of Eurocentric thought in knowledge, social theory, and education. Therefore, epistemic freedom is foundational in the broader decolonisation struggle because it enables the emergence of critical decolonial consciousness.

It also emerged that within indigenous African context there are a lot of health practices which are not presented in the curriculum. This was precisely defined as the discrimination and unfair marginalisation of indigenous knowledge in higher education (Hungwe and Tofirepi, 2021). These findings suggest that the curriculum in higher education is promoting epistemic injustices (Ndlovu-Gatsheni, 2018). If these epistemic injustices are not addressed, especially by teacher educators to promote social justice, they run the risk of reproducing racism, stereotypes, and existing inequalities and the current social order that is marked by injustice and unfairness (Blignaut & Koopman, 2020).

These results should be considered when policy makers and curriculum developers are developing policies and curriculum documents such that curricula is reflective of the students' lived experiences. In my study pre-service teacher through a bottom-up approach to decolonising the curriculum were afforded the opportunity to initiate an epistemic transformation and integrate IK into their modules.

My work demonstrates that there is room for actual reform of the content and pedagogy in higher education, whereas prior research has concentrated on identifying the nature of epistemic violence. My study offered realistic decolonial strategies based on the *Ubuntu* ideology. Most notably, a curriculum must encourage students to recognise themselves and others, to form constructive relationships, to work together, to nurture their minds, to learn from a place of love and care, and to use their linguistic resources to foster meaningful learning (Ukpokodu, 2016).

### **8.7 Conclusions, recommendations and study critique**

This section contains the concluding remarks and recommendations. The study examined how IK of disease management can be incorporated into the Biology curriculum for pre-service teachers.

### *8.7.1 Concluding remarks*

Decolonisation as a process of demanding epistemic justice, is far from being a reality. Governments with their constitutions and ministries, and universities with their mission statements, articulate a decolonial vision, but it is not sufficiently translated into curriculum change. In redesigning the Biology curriculum to incorporate Karanga knowledge, I began by exploring the Karanga worldview of infectious diseases. A holistic view was presented by them, in which diseases were associated with ancestral misfortune and neglect. Restoring ancestral protection reflected the metaphysical aspect of healing. An ethno-medicinal approach based on healing with plant materials, was the pragmatic strategy of the KHs. Many plants were shared and the preparation of medicines, including dosage, was discussed. Social behavioural measures such as isolation, social distancing, not sharing clothes and utensils, and adherence to basic hygienic health practices, were emphasised by the KHs. The way KHs teach apprentices was also highlighted. Songs, games, dances, and storytelling were among the methods they used to teach. In addition, hands-on field trips, direct observation of plants, demonstration of sustainable harvesting methods, and direct participation in the preparation of medicines, were favoured as effective teaching methods. Throughout the process, KHs demonstrated their trust in, respect for, and appreciation of ancestral wisdom.

The results of the study suggest that teacher education modules can be made more culturally inclusive. To do so, university modules must be deconstructed to find ways to incorporate IK in terms of the 'what' (content), the 'who' (teachers), and the 'how' (pedagogy) of knowledge construction. The active search for IK, consistent with Chilisa's (2012) recovery and rediscovery, is critical. In this study, KHs' knowledge revealed a holistic worldview about infections and practical methods for managing infections. The KHs' knowledge of useful types of plants and how to make medicines from them, can be integrated into the modules.

Teaching methods that include field trips, harvesting of medicinal plants, and hands-on preparation of medicines, serve as means to incorporate indigenous knowledge into the curriculum. Socio-behavioural interventions to treat diseases, can also be included. Re-establishing KHs as teachers within the academy, will restore appreciation for the producers and transmitters of indigenous knowledge.

Creating a culturally inclusive approach would allow the rich repository of IK to be utilised in the Biology teacher education curriculum. This "disruption of the epistemological status quo has the potential to shape their (student teachers') teacher identities" (Mudaly 2018, p.62). An epistemological rethinking (Matiwana, 2019) from the Euro-Western canon is possible as teachers become familiar with other ways of knowing. Respectful representation of IK (Le Grange 2016) requires tapping into indigenous knowledge for its inclusion in the curriculum. Reconstructing the curriculum can be realised through commitment and action (Chilisa, 2012) by raising awareness of the value of IK in solving contemporary problems and by developing creative ways to incorporate IK into teacher education.

#### *8.7.2 Recommendations for policy makers*

The government must take measures to ensure that the nation's aspirations, clearly articulated in the constitution, are realised through the practical implementation of policies by universities. Furthermore, universities, as key actors in promoting multiculturalism, must foster poly-epistemic ecosystems in which their curricula identifies with a diversity of knowledge systems. Universities must recognise indigenous communities as potential partners in knowledge generation by seeking to implement a heritage-based philosophy as embodied in the 'Education 5.0' framework, called for by higher education in Zimbabwe (GoZ, 2018).

Universities must strive to rethink the role of students in relation to the curriculum. Students should no longer be viewed as passive recipients of knowledge, but as co-producers of knowledge.

University assessment should shift from promoting excellence, to relevance, as knowledge ought to be identified with community-based skills, values, and ethos. Student innovation is thus envisaged.

The over-reliance on funding from the Euro-West and its educational models, must be challenged as this destroys the autonomy of universities in Africa.

Decolonial practices should be an integral part of most courses, as the study showed that there is much IK that is not being utilised, but is highly respected and practised in the communities surrounding the universities.

#### *7.9.3 Recommendations for Karanga healers*

Traditional Karanga healers need to be encouraged to participate fully in the educational system (formally or informally). Their role is not only to preserve cultural heritage, but as custodians of IK, they should feel free to share this knowledge to avoid its erosion and undervaluation.

#### *8.7.3 Recommendations for further studies*

One of the main recommendations made in this study is that future research should concentrate on discovering and utilising indigenous methodologies rather than solely adopting Euro-Western forms. This would facilitate the incorporation of IK-based research, ultimately resulting in the decolonisation of knowledge creation and dissemination.

Additionally, this study advises research to be ethical when working with indigenous healers.

Co-knowledge production between academic institutions and the communities they serve might benefit from this.

The report concludes by urging students to participate in curriculum decisions as equal stakeholders. In order to start a bottom-up process of curricular decolonization, students should also be involved in critical reflections of the content and methodology that define their everyday learning.

### **8.8 Limitations of the study**

The study was entirely based on traditional Euro-Western research methodology, which leave out IK research methods. In this instance, I only used research procedures with a Euro-Western foundation, which caused conflict in the already contradictory research environment. This is in contrast to Chilisa (2012) and Smith (2012)'s recommendations for various indigenous research approaches that might be applied when conducting decolonial studies. The study could not afford the opportunity for direct engagement among pre-service teachers, university lecturers and KHS. This somehow undermined the principle of the complicated curriculum conversation.

### **8.9 Final conclusion**

The present investigation identified some KH practices that are employed to control infections. It became clear that the majority of KHS appreciate their innate expertise for treating various illnesses. They have understanding of both the spiritual and physical worlds' perspectives on healing. Additionally, it was discovered that IK is underrepresented in the Biology PST modules, where the Euro-Western model of education predominates in terms of both material coverage and instructional strategies. The study identified potential approaches to integrating IK into the PSTs' current courses at a university in Zimbabwe. Notably, the study recommended the development of an integrative curricular model that values the opinions of all stakeholders, including students and local elders. an integrated curriculum model of a curriculum that value the voices of different stakeholders such as

students and community elders. An integrative model of a curriculum is inclusive of different knowledge worldviews.

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## APPENDICES

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## APPENDIX A: Clearance letter from the University of KwaZulu-Natal



15 September 2020

**Mr Kutenda Trinos (220108403)**  
**School of Education**  
**Edgewood Campus**

Dear Mr Trinos,

**Protocol reference number: HSSREC/00001877/2020**

**Project title:** Exploring the possibilities for including Indigenous Knowledge of the Karanga knowledge holders in the pre-service teacher education curriculum: A focus on infectious diseases in the time of Corona Virus Disease-2019 (COVID-19)

**Degree:** PhD

### Approval Notification – Expedited Application

This letter serves to notify you that your application received on 26 August 2020 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) 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.**

This approval is valid until 17 September 2021.

To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 - 3 months before the expiry date. A close-out report to be submitted when study is finished.

**All research conducted during the COVID-19 period must adhere to the national and UKZN guidelines.**

HSSREC is registered with the South African National Research Ethics Council (REC-040414-040).

Yours sincerely,



Professor Dipane Hlalele (Chair)

/ms

### Humanities and Social Sciences Research Ethics Committee

Postal Address: Private Bag X54001, Durban, 4000, South Africa

Telephone: +27 (0)31 260 8350/4557/3587 Email: [hssrec@ukzn.ac.za](mailto:hssrec@ukzn.ac.za) Website: <http://research.ukzn.ac.za/Research-Ethics>

Founding Campuses: ■ Edgewood ■ Howard College ■ Medical School ■ Pietermaritzburg ■ Westville

**INSPIRING GREATNESS**

## APPENDIX B: Change of title



10 February 2022

Kutenda Trinos (220108403)  
School of Education  
Edgewood Campus

Dear K Trinos,

Protocol reference number: HSSREC/00001877/2020

Project title: Exploring the possibilities for including Indigenous Knowledge (IK) of the Karanga IK holders in the pre-service teacher education curriculum: A focus on infectious diseases in the time of COVID-19

Amended title: Indigenous knowledge and infectious diseases: Rethinking the teacher education Biology curriculum

Degree: PhD

### Approval Notification – Amendment Application

This letter serves to notify you that your application and request for an amendment received on 13 July 2021 has now been approved as follows:

- Change in title

Any alterations to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form; Title of the Project, Location of the Study must be reviewed and approved through an 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.

All research conducted during the COVID-19 period must adhere to the national and UKZN guidelines.

Best wishes for the successful completion of your research protocol.

Yours faithfully




Professor Dipane Hlalele (Chair)

/ms

#### Humanities and Social Sciences Research Ethics Committee

Postal Address: Private Bag X54001, Durban, 4000, South Africa

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Founding Campuses:  Edgewood  Howard College  Medical School  Pietermaritzburg  Westville

INSPIRING GREATNESS

## APPENDIX C: Permission letter from the participating University

Office of the Registrar  
Mr T Zishiri

P Bag 9055  
GWERU  
Telephone 260180/260450  
Fax: 263-054-260735  
Email: zishiri@staff.msu.ac.zw



MIDLANDS STATE UNIVERSITY

26 August 2020

Mr T Kutenda  
Research Office  
Govan Mbeki Building  
P Bag 54001  
Durban 4000  
KwaZulu-Natal  
South Africa

Dear Mr Trinos Kutenda

RE: REQUEST FOR AUTHORITY TO DO RESEARCH AT MIDLANDS STATE UNIVERSITY ON "EXPLORING POSSIBILITIES FOR INCLUDING INDIGENOUS KNOWLEDGE (IK) OF THE KARANGA KNOWLEDGE HOLDERS IN THE PRE-SERVICE TEACHER EDUCATION CURRICULUM: A FOCUS ON INFECTIOUS DISEASES IN THE TIME OF COVID-19"

With reference to your letter in which you requested to carry out Research on "Exploring possibilities for including Indigenous (IK) of the the Karanga knowledge holders in the pre-service teacher education curriculum: A focus on infectious diseases in the time of COVID-19.", please be advised that Midlands State University has granted you permission to carry out your research.

We would appreciate if you could supply the University with a final copy of your study. Also kindly note that the University expects you to use the information acquired during your study solely for research purposes.

I hope that you will get all the assistance and cooperation you need from the University Community.

Thank you.

Mr T Zishiri  
University Registrar



## APPENDIX D: Permission letter from the chief

Declaration

*PhD: Kutenda Trinos*


*Exploring possibilities for including Indigenous Knowledge (IK) of the Karanga knowledge holders in the pre-service teacher education curriculum: A focus on infectious diseases in the time of COVID-19*

I, *Panicho Gege Mademjika* Chief Chingoma.....of  
Mberengwa District in the Midlands Province of Zimbabwe

Hereby

~~GRANT~~ ~~DO NOT GRANT~~ (delete that which is not applicable) permission to  
*Kutenda Trinos*..... (Student's name) to conduct this research on,  
"Exploring possibilities for including Indigenous Knowledge (IK) of the Karanga knowledge holders in the pre-service teacher education curriculum: A focus on infectious diseases in the time of Covid-19", in my area. I understand participation of the IK holders is voluntary with no monetary benefits and every participant has the right to withdraw at any time of the study or alternatively opt not to participate.

*Panicho Gege Mademjika*



Date

Signature of witness  
(Where applicable)

.....

Signature of interpreter  
(Where applicable)

.....

Stamp

MIN. OF HOME AFFAIRS  
& CULTURE  
CHIEF CHINGOMA  
P. BAG. 3 MATAJA ZIMBABWE  
Date: 12-05-20  
093 2135 179

## APPENDIX E: Letter of informed consent for Karanga healers



Research Office

Govan Mbeki Building

Private Bag X 54001  
Durban, 4000

KwaZulu-Natal, South Africa

Tel: 27 31 2604557 - Fax: 27 31  
2604609

Email: [HSSREC@ukzn.ac.za](mailto:HSSREC@ukzn.ac.za)

Date: 21 October 2020

Dear Karanga Healer

My name is Kutenda Trinos; I am a PhD student in the Science and Technology Education Cluster at the University of KwaZulu-Natal. I am pursuing a Doctoral Degree in Science Education entitled: **Indigenous knowledge and infectious diseases: Rethinking the teacher education Biology curriculum.**

You are being invited to consider participating in a study that involves research about health practices related to infectious diseases amongst your people and possibilities of including indigenous knowledge into teacher education curriculum.

**Purpose:** The purpose of the study is to document all your indigenous health practices related to infectious diseases and emerging infections, and find ways by which these knowledges and practices can be included in the Biology curriculum for pre-service teachers. This would help with co-knowledge production between the Western and African health practices in mitigating diseases. Through your participation I hope to gain a deep understand of the IK of infectious diseases in terms of knowledge and practices.

There are no potential risks associated with your participation in this study. There are no direct benefits for participating in this study. Your participation is voluntary, and you may withdraw at any time during the course of the study. Alternatively you may choose not to participate. All the information collected will be kept privately and you will not be identified by name. You will be requested to participate in a single interview session that can be done face to face or telephonically. The interview may last for 20-30 minutes.

You will not receive any financial or material benefits or any other compensation for participating in this study. It is important to note that any costs related to participation in the study are met by the researcher. Any costs related to participation are borne by the study and

are not a responsibility of the participant. Though no direct benefit from this study to you is promised, your participation will help policy formulation towards the resuscitation of the marginalised IK in tertiary education.

This study has been ethically reviewed and approved by the UKZN Humanities and Social Sciences Research Ethics Committee (HSSREC/00001877/2020).

Thank you

Yours faithfully

---

Mr Kutenda Trinos

My contact details:

Phone number: 0842182121

Email address: [220108403@stu.ukzn.ac.za](mailto:220108403@stu.ukzn.ac.za)

In the event of any problems or concerns/questions you may contact the researcher on the above phone number or my Supervisor Professor Ronicka Mudaly or the UKZN Humanities & Social Sciences Research Ethics Committee, contact details as follows:

Contact details:

Professor Ronicka Mudaly

Email: [mudalyr@ukzn.ac.za](mailto:mudalyr@ukzn.ac.za)

Phone number: 031 260 3643.

Research Office, Westville Campus

Govan Mbeki Building

Private Bag X 54001

Durban

4000

KwaZulu-Natal, South Africa

Tel: 27 31 2604557- Fax: 27 31 2604609

Email: [HSSREC@ukzn.ac.za](mailto:HSSREC@ukzn.ac.za)

**DECLARATION**

PhD: Kutenda Trinos (220108403)

**Title: Indigenous knowledge and infectious diseases: Rethinking the teacher education Biology curriculum.**

I ..... (Full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project.

I understand that:

- I will participate voluntarily and am at liberty to withdraw from the project at any time, should I so desire, with no negative consequences.
- I voluntarily give permission for the study's activities to be digitally recorded.
- My identity will not be disclosed.
- I hereby provide consent to:

	YES	NO
Audio-record my interview		
Use of my photographs for research purposes		

\_\_\_\_\_  
Signature of Participant

\_\_\_\_\_  
Date

**APPENDIX F: Letter of informed consent for pre-service teachers**

Research Office

Govan Mbeki Building

Private Bag X 54001

Durban

4000

KwaZulu-Natal, South Africa

Tel: 27 31 2604557 - Fax: 27 31  
2604609

Email: [HSSREC@ukzn.ac.za](mailto:HSSREC@ukzn.ac.za)

Date: .....

Dear Pre-service Biology Teachers

My name is Kutenda Trinos, and I am a PhD student in the College of Science, Mathematics and Technology Education at the University of KwaZulu-Natal. I am pursuing a Doctoral Degree in Science Education entitled: **Indigenous knowledge and infectious diseases: Rethinking the teacher education Biology curriculum.**

You are being invited to consider participating in a study that involves research, and learning about IK related to infectious diseases of the Karanga people and possibilities of inclusion into teacher education curriculum.

**Purpose:** The purpose of the study is to document all indigenous health practices related to infectious diseases and emerging infections of the Karanga healers and find ways by which these knowledge and practices can be included in the Biology curriculum for pre-service teachers. This would help with co-knowledge production between the Western and African health practices in mitigating diseases.

Through your participation I hope to understand your views on how we can incorporate IK of infectious diseases into your Biology curriculum and to find out how you will infuse IK into your lessons in the time of COVID-19.

There are no potential risks associated with your participation in this study. There are no benefits for participating in this study. Your participation is voluntary and you may withdraw at any time during the course of the study. Alternatively you may choose not to participate. All the information collected will be kept privately and you will not be identified by name. You will be requested to participate in three focus group interview sessions that can be done using Zoom. Each interview may approximately last for 20-30 minutes. You will be requested to avail one lesson plans intended for use in teaching. The lesson plan will be

analysed to find out how IK content and pedagogy relative to infectious are being infused into daily teaching.

You will not receive any financial or material benefits or any other compensation for participating in this study. Though no direct benefit from this study to you is promised, you may gain individual and professional understanding of ethno-medical practices that are crucial in the provision of primary health care amongst the Karanga people of Mberengwa and contribute greatly to the need for restoring the status of IK.

This study has been ethically reviewed and approved by the UKZN Humanities and Social Sciences Research Ethics Committee (HSSREC/00001877/2020).

Thank you

Yours faithfully

---

Mr Kutenda Trinos

My contact details:

Phone number: 0812188903

Email address: [220108403@stu.ukzn.ac.za](mailto:220108403@stu.ukzn.ac.za)

In the event of any problems or concerns/questions you may contact the researcher on the above phone number or my Supervisor Professor Ronicka Mudaly or the UKZN Humanities & Social Sciences Research Ethics Committee, contact details as follows:

Contact details:

Professor Ronicka Mudaly

Email: [mudalyr@ukzn.ac.za](mailto:mudalyr@ukzn.ac.za)

Phone number: 031 260 3643.

Research Office, Westville Campus

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Durban

4000

KwaZulu-Natal, South Africa

Tel: 27 31 2604557- Fax: 27 31 2604609

Email: [HSSREC@ukzn.ac.za](mailto:HSSREC@ukzn.ac.za)

**DECLARATION**

PhD: Kutenda Trinos

**Title: Indigenous knowledge and infectious diseases: Rethinking the teacher education Biology curriculum.**

I ..... (Full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project.

I understand that:

- I will participate voluntarily and am at liberty to withdraw from the project at any time, should I so desire, with no negative consequences.
- I voluntarily give permission for the study's activities to be digitally recorded.
- My identity will not be disclosed.
- I hereby provide consent to:

	YES	NO
Audio-record my interview / focus group discussion		

---

 Signature of Participant
 

---



---

 Date
 

---

**APPENDIX G: Interview guide for KHS**

## Section A: Demographic data

- I. May you share information about
  - a) Your age
  - b) Language
  - c) Gender
  - d) Language
  - e) Years of practicing
  - f) Level of education
  - g) Your language

## Section B: Interview questions

- I. How do you explain the outbreak of infectious diseases from an indigenous point of view?
- II. Explain how do you diagnose people for any form of infection?
- III. May you elaborate on how you prevent the spread of infectious diseases and treat them in your community?
- IV. Traditional herbs/medicines are commonly used to prevent and heal infectious diseases. May you share the herbs or medicines that you use to prevent a person from infectious diseases? May you show me how you harvest and administer the herbs, if you are comfortable?
- V. What community practices are there in place to protect your people from infectious diseases including possible emerging infections?
- VI. How do you educate the community about infectious diseases?
- VII. How do you keep your know and transmit it from generation to generations? I mean is it written down?

## **APPENDIX H: Document analysis guide for the Biology curriculum**

### **Section A: Information about the document**

- I. Creator/Author.....
- II. Context: 1. Place of publication.....  
2. Year of publication.....
- III. Intended audience: .....
- IV. Purpose of document:
- V. Type of document: .....
- VI. Main points/aims
- VII. Significance of the document:

### **Section B: Analysis questions**

- I. What topics are related to existing infectious diseases?
- II. What topics address possible emerging infectious diseases?
- III. Which topics can be related to the spread, prevention and treatment of infectious disease including emerging infections?
- IV. How is the content related to infectious diseases being taught to pre-service teachers?
- V. What approaches are used to teach health concepts of infectious diseases both in and out of lecture rooms?
- VI. a) Which epistemologies and pedagogies are privileged in the Biology module?  
b) Which knowledge producers are privileged?  
c) Is African knowledge privileged? Elaboration  
d) If so to what extent?
- VI. How has AIKS been infused into the module, if at all?

**APPENDIX I: FGI Schedule for pre-service teachers**

- I. Do you think it is a good idea to have IK knowledge content and practice of infectious diseases in the Biology curriculum for pre-service teachers? Explain the benefits if any.
- II. May you identify content knowledge and pedagogical aspects from an indigenous position that you think can be included into the Biology curriculum for pre-service teachers?
- III. What are the best approaches which can be used to include IK of diseases management into the current Biology curriculum? You explain.
- IV. What challenges do you think may be encountered when trying to include IK of infectious diseases into the Biology curriculum? And how do you think these challenges can be addressed?

**APPENDIX J: Document analysis guide for the lesson plan****Section A: Information about the document**

- I. Creator/Author.....
- II. Context: 1. Place of publication.....  
2. Year of publication.....
- III. Intended audience: .....
- IV. Purpose of document:
- V. Type of document: .....
- VI. Main points/Aims

**Section B: Analysis questions**

- I. Topic planned for: .....
- II. Duration of the lesson: .....
- III. Nature of aims and objectives related to IK of infectious diseases and emerging infections such as COVID-19
- IV. Approaches related to IK of infectious diseases and emerging infections such as COVID-19
- V. Cross cutting themes related to IK of infectious diseases
- VI. Practical application of IK of infectious diseases and emerging infections
- VII. Assessment criterion within the IK framework

## **APPENDIX K: Biology modules for pre-service teachers**

Biological Sciences (BSc)

### INTRODUCTION

1.1 These regulations shall be read in conjunction with the Special Faculty and General Academic Regulations.

1.2 The course develops from observations of biological phenomena at the broadest scales (Biosphere and Ecosystems) to those at the finest (molecular) level. Strong emphasis is placed throughout on methods of biological investigations. The interrelationship of Biological Sciences to other subjects is stressed, although, the distinctiveness of Biology should also be apparent.

### 2. OBJECTIVES

2.1 After completing the programme, students should be able to: work in Biology related fields, carry out postgraduate studies in Biological Sciences and other related fields, provide solutions to environmental problems and participate actively in the development of the country.

### 3. CAREER PROSPECTS

Graduates with the BSc Honours degree Biological Sciences can be employed as the following:

- research scientists in research institutions and medical laboratories,
- ecologists with National Parks or environmental organizations,
- microbiologists in the food and pharmaceutical industries,
- geneticists in plant and animal breeding,
- entomologists in research institutions,
- parasitologists in research institutions and medical laboratories,
- curators in various disciplines in the Natural History Museum,
- botanists in research institutions and National Parks, and
- lecturers in Technical colleges as well as A' Level Biology teachers.

### 4. ENTRY REQUIREMENTS

In order to qualify for acceptance into the BSc (Honours) degree in Biological Sciences, a student should possess the following qualifications:

#### 4.1 Normal Entry

Passes at “A” level in Biology and any one of the following subjects: Mathematics, Physics, Chemistry or Geography.

## 4.2 Special Entry

The following persons may apply for Special Entry and for permission to proceed to a first degree with exemption from the whole or part of the normal entry requirements:-

4.2.1 A person who has obtained a degree of this or another University or degree awarding institution.

4.2.2 A person who has obtained from another University or an Institution of similar status, academic qualifications (other than degrees) acceptable to Senate. These may include a diploma in Education, Forestry, Fisheries, Entomology, Food Science and Biological Sciences.

4.2.3 Students who qualify under the Special Entry may apply to Senate to be exempted from certain modules and examinations.

## 11. MODULE SYNOPSES

### HBIO 111 Immunology

Definition of immunology; cellular participants in immune response i.e. leukocytes; types of immunity, passive vs acquired, cytotoxic T lymphocytes, cytokines; primary and secondary responses; antigens and antigen processing; structure and functions of antibodies (the immunoglobulin fold, including experiments that led to the elaboration of this structure); Antibody – antigen interactions, non-covalent interactions, affinity, avidity, specificity; Antibody – antigen reactions (neutralisation, precipitation, agglutination); Theory of vaccination; Basis of cellular immunity – clonal selection theory of McFarlane Burnet; Immune tolerance; Monoclonal vs polyclonal antibodies; AIDS and HIV -immunological basis.

### HBIO202 Bacteriology

The history of bacteriology. The methods in microbiology, including principles of aseptic techniques, sterilisation and exenic culture. Review of bacterial cell structure. Bacterial diversity, including methods and criteria used for identification and classification. Basic principles of bacterial nutrition. Bacterial metabolic pathways; chemoautotrophy and photosynthesis. Bacterial genetics the nature and replication of the bacterial genome, mutation, transformation, transduction and conjugation.

### ELECTIVES:

#### HBIO 403 Animal Parasitology

Intimate associations; protoctistan parasites; life cycle strategies; categories of nematode parasitism; cestodes; digeneans; monogeneans and acanthocephalans; parasitic arthropods; host specificity; host response and defence; parasite evasion of immunity; adaptations to parasitism; parasite control; specimen collection and analysis.

#### HBIO 409 Microbial Genetics and Virology

Mutations and genetics of mutations, recombinant systems in fungi, prokaryotes and viruses-including conjugation, transduction and transformation. Introduction to genetic engineering in microorganisms. DNA and RNA bacteriophages, detailed descriptions of the main genera

and groups of animal and plant viruses, virus genetics and variability. Virus detection and serology.

Contact Us

Postal Address

P Bag 9055

Gweru

Zimbabwe

Tel: +263 54 2260359

Fax: +263 54 2260233

[infoandpr@staff.msu.ac.zw](mailto:infoandpr@staff.msu.ac.zw)

## **APPENDIX L: O Level Biology syllabus**

Biology Syllabus Forms 3 - 4

### **1.0 PREAMBLE**

#### **1.1. Introduction**

The Biology Syllabus is designed for learners in Forms 3 and 4. The learners are expected to acquire theory and practical skills as well as develop cognitively, emotionally, physically and socially. The syllabus aims at balancing knowledge, understanding and practical skills in order to produce effective learners. The content provides a firm foundation for careers such as in Medicine, Food Technology, Biotechnology and Environmental Science.

#### **1.2. Rationale**

Biology is the study of the dynamic relationships between living things, their interdependence, their interactions with the non-living environment and the processes that maintain life and ensure its continuity. This syllabus encourages learners to employ biological skills in solving real life problems and also emphasizes the link between human activities and the environment. Learners acquire knowledge and skills of inquiry that help them to critically examine issues that arise in their own lives and in the public domain. The skills will be acquired through understanding of biological concepts and practical application. It is therefore important that the learners be afforded an opportunity to study Biology as they prepare for self-reliance and future careers.

#### **1.3. Summary of Content**

The content covered by this syllabus includes theory and practical skills in the broad areas of Biology such as Biochemistry, Cytology, Anatomy, Physiology, Genetics, Ecology, Systematics, Health and Disease.

#### **1.4 Assumptions**

The syllabus assumes that learners have:

- acquired skills in handling apparatus
- learnt about the hazards and safety precautions during experiments
- knowledge of the basic concepts of Biology
- developed an awareness of and interest in the conservation of the environment
- a basic understanding of health and disease issues

#### **1.5 Cross- Cutting Themes**

In order to foster competency development for further studies, life and work, the following cross-cutting priorities have been taken into consideration:

- Gender and inclusivity
- Environmental issues
- Information and Communication Technology Tools
- Children's Rights and Responsibilities
- Disaster Risk Management
- Life Skills
- Collaboration
- Sexuality, HIV and AIDS
- Respect for life
- Heritage studies

## **2.0 PRESENTATION OF SYLLABUS**

The Biology syllabus is presented as a stand-alone document with content to be covered in Forms 3 and 4.

### **3.0 AIMS**

The syllabus aims to help learners:

3.1 appreciate the contribution of Biology to the sustainable socio-economic development of the country

3.2 develop practical skills such as accuracy, objectivity, integrity and enquiry

3.3 develop good practices for health and safety

3.4 apply scientific method in solving everyday life challenges

3.5 recognise that the study and practice of Biology are inter-related.

3.6 appreciate that the study and practice of Biology are subject to economic, technological, social, political, ethical and cultural influences

3.7 develop an interest in caring for the local and global environment

### **4.0 SYLLABUS OBJECTIVES**

Learners should be able to:

4.1 demonstrate knowledge of biological terms, laws, facts, concepts, principles, theories and phenomena

4.2 use appropriate technological instruments to collect and analyse data

4.3 conduct experiments using the scientific methods of enquiry

4.4 apply health and safety precautions in everyday life

4.5 draw biological diagrams in two dimension

4.6 carry out simple scientific calculations

4.7 translate information from one form to another

4.8 draw logical conclusions based on the examination of evidence

4.9 communicate information logically and concisely

4.10 apply biological principles in solving problems and understanding new situations

4.11 identify the practical constraints affecting biological investigations

4.12 use biological principles, methods and techniques in value addition

4.13 explain the effects of technological applications on the environment

4.14 interpret the relationship between living organisms and their environment

## **5.0 METHODOLOGY AND TIME ALLOCATION**

### **5.1 Methodology**

The syllabus is based upon interactive, multi-sensory, learner centered and practical approaches. Principles of individuality, team work, wholeness and stimulation must be applied to enhance the learning and teaching process.

The learners should be allowed to apply their experiences, knowledge, skills and attitudes in the learning of the subject. The following are the suggested methods:

5.1.1 Experimentation

5.1.2 Discovery

5.1.3 Demonstrations

5.1.4 Problem solving

5.1.5 Discussions

5.1.6 Visual tactile

5.1.7 e-learning

5.1.8 Group work

5.1.9 Educational tours

5.1.10 Project based learning

5.1.11 Case studies

5.1.12 Observations

5.1.13 Simulations

## **5.2 Time Allocation**

For adequate coverage of the syllabus, a time allocation of 8 periods of at least 35 minutes each per week is recommended. Double periods are recommended.

## **6.0. TOPICS**

The syllabus consists of eleven topics

6.1 Branches of Biology

6.2 Chemicals of life

6.3 Cells and cellular activities

6.4 Enzymes

6.5 Plant science

6.6 Animal science

6.7 MicroBiology and Biotechnology

6.8 Genetics

6.9 Biodiversity

6.10 Ecosystems

6.11 Health and Disease

## 8.11 TOPIC 11 HEALTH AND DISEASE CONTD..

KEY CONCEPT	LEARNING OBJECTIVES Learner should be able to	CONTENT (Attitudes, Knowledge and Skills)	SUGGESTED LEARNING	SUGGESTED RESOURCES
8.11.1 Health		<ul style="list-style-type: none"> <li>- Waste disposal methods</li> <li>- Provision of clean, safe drinking water</li> <li>- Sanitation</li> <li>- Provision of health facilities such as clinics</li> </ul>		
8.11.2 Diseases	<ul style="list-style-type: none"> <li>• define a disease</li> <li>• state causes of diseases</li> <li>• classify diseases into infectious and non-infectious diseases</li> <li>• state the causative agent, mode of transmission and signs and symptoms of infectious diseases</li> <li>• explain ways of preventing and treating infectious diseases</li> </ul>	<ul style="list-style-type: none"> <li>• Definition of disease</li> <li>• Causes such as:               <ul style="list-style-type: none"> <li>- infection,</li> <li>- Genetic defects</li> <li>- Chemicals</li> <li>- Radiation</li> <li>- malnutrition</li> <li>- degenerative causes</li> </ul> </li> <li>• Infectious diseases               <ul style="list-style-type: none"> <li>- Cholera</li> <li>- Malaria</li> <li>- Tuberculosis (TB)</li> <li>- Typhoid</li> <li>- Bilharzia</li> </ul> </li> <li>• Non-infectious diseases               <ul style="list-style-type: none"> <li>- Deficiency diseases</li> <li>- Genetic diseases</li> <li>- Cancer</li> </ul> </li> <li>• Causative agents, mode of transmission and signs and symptoms of infectious diseases (NB Scientific names of causative agents not required)</li> <li>• Prevention and treatment of infectious diseases</li> </ul>	<ul style="list-style-type: none"> <li>• Discussing the concept of disease</li> <li>• Classifying diseases into infectious and non-infectious.</li> <li>• Discussing causes of diseases.</li> <li>• Researching on causes, mode of transmission, signs and symptoms and ways of treating and preventing infectious diseases.</li> <li>• Discussing research findings.</li> </ul>	<ul style="list-style-type: none"> <li>• ICT tools</li> <li>• Braille software/Jaws</li> <li>• Resource persons</li> </ul>

**APPENDIX M: Editing certificate**

**To whom it may concern**

**This is to confirm that the doctoral thesis submitted by**

**KUTENDA TRINOS**

**has been language edited**

**TOPIC: Indigenous knowledge and infectious diseases:  
Rethinking the teacher education biology curriculum**

**M. Govender**

**Date: 29/11/2022**

**monica.govender@outlook.com**

**084 4646898**



## APPENDIX N: Turnitin report

### Indigenous knowledge and infectious disease

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6%

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