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Possibilities of integrating indigenous knowledge into classroom science: The case of plant healing

by

Vongai Mpofu

A thesis submitted to the Faculty of Humanities, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements of the degree of Doctor of Philosophy.

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Abstract

This study was conducted in an indigenous community of Tendera in Chiweshe District of Mashonaland Central Province in Zimbabwe. It pursued the possibilities of integrating indigenous knowledge of plant healing (IKoPH) into classroom science at The Zimbabwe Junior Certificate (ZJC) level. The study has documented this knowledge and has suggested ways that it could be integrated into the ZJC science curricula. My own background and the challenges of integrating indigenous knowledge into school science curriculum reform in Zimbabwe and elsewhere motivated me to undertake this study. This research journey preceded my full knowledge that these reforms encompass many complexities arising from two different knowledge systems. The integration process of indigenous knowledge in Zimbabwean schools has been very slow because of these complexities, which include lack of curriculum frameworks to guide teachers on what to teach, where to teach this knowledge in the westernised syllabi, how to access this knowledge from the community and how to teach it. Hence, the study argued that science teachers are in dire need of these guidelines and training. If this problem is left unattended, curriculum reform in Zimbabwe will remain a pipe dream.

The study was framed within a self-developed Culturally Aligning Classroom Science (CACS) framework. It used a qualitative approach to research specifically engaging the Indigenous African Interpretive (IAI) methodology. Qualitative data were generated with purposely sampled teachers, healers and learners as core participants and community Elders, Ministry officers/practitioners and researchers as key participants. It was generated through video/audio and/or diarised observations, conversations, personal experiences and objects (documents and artefacts). The “kitic” analysis of data generated three major themes that are: (1) the community of Tendera is rich in IKoPH and its members have disparate views of integration that are significant for integrative classroom science. This IKoPH, however, emerged to be a sensitive, secretive, diverse and complex body of knowledge which requires access through culturally appropriate strategies, which demand collaboration between the community and the school; (2) The ZJC science curriculum presents several opportunities for integration of IKoPH that shows that this integrated curriculum is possible in Zimbabwe; and (3) oral pedagogical frames grounded in the parallel pathway to integration are potentially supportive of effective integrative classroom science. The study offers two models that could help integrators to overcome the complexities inherent in this reform. Further research into different aspects of these models and teacher capacitation to adopt them is needed to develop an integrative classroom science discourse.

Declaration

I declare that this thesis is my own, unaided work. It is being submitted for the Degree of Doctor of Philosophy at the University of the Witwatersrand, Johannesburg, South Africa. It has not been submitted before for any degree or examination in any other University.

_____

_____ day of March 2016

Dedication

I dedicate this product to the people of Tendera who, as indigenous custodians of the land they inhabit in Chiweshe, its plant resources and their cultural knowledge, offered overwhelming collaborative support throughout its process.

To my late father, Finish Makozho Wakasemwa, the Great Healer, school and community leader, together with our ancestral healing spirits that, I strongly believe, guided my access, negotiation and acceptance into the community of Tendera.

To my parents who encouraged me with their own coping strategies for dealing with multiple roles. They modelled and taught me honesty, creativity, perseverance and resilience. If it were not for my mother, Emma Vongai Makozho's no-nonsense, no-laziness and no-spoiling upbringing, I would not have managed the challenges I faced throughout my study. It called for determination, perseverance and introspection. Thank you *ambuya* Makozho! As a child, I thought you were hard on me, but I now realise it was worthwhile and empowering. Bringing me up along a narrow path gave me the tools to climb right through my education.

And

To myself, Vongai Tracey Kutsigira, for who I was, I am now and will be.

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A Doctor of Philosophy (PhD) qualification is not an endpoint but a journey walked with and through various people.

It has been a thorny journey with many interruptions. There were times I felt, after all, it was not a bad idea to quit. But here I am at last! I gratefully acknowledge the supervision and support of Drs Emmanuel Mushayikwa and Femi S. Otulaja. To Professor Elaosi Vhurumuku, thank you for waking me up to the indigenous knowledge of plant healing research strand.

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This study would not have been possible without the financial assistance I received from the Bindura University of Science Education (Bindura University), Wits Financial Aid and Scholarships Office, the Humanities Graduate Centre, and the Marang Centre.

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Abbreviations

ANKN	Alaska Native Knowledge Network
CAT	Contiguity Argumentation Theory
CBPR	Community-Based Participation Research
CACS	Culturally Aligning Classroom Science
DCPS	Divergent, Convergent, Parallel and Substitutive
E3P	Enterprise, Process, Paradigm and Product
EC3PL	Enterprise, Content, Purpose, Place, Pedagogy and Language
EL5P	Enterprise, Language Paradigm, Process, Product, Place and, Pedagogy
HIV/AIDS	Human immunodeficiency virus/Acquired immunodeficiency syndrome
IAI	Indigenous African Interpretive
ICS	Integrative Classroom Science
IGC	Individual Group Class
IKS	Indigenous Knowledge Systems
IKoPH	Indigenous Knowledge of Plant Healing
OBSCON	Observation and/conversions
OCI	Observed Critical incidences
PCP	Purpose, Content and Pedagogy
POEMAR	Philosophy, Ontology, Epistemology, Methodology, Axiology, Rhetoric
PhD	Doctor of Philosophy
SAARMSTE	Southern African Association for Research in Mathematics, Science and Technology Education
SPETH	Social, Political, Economic, Technological and Historical
STI	Sexually Transmitted Infections
WHO	World Health Organisation
ZIMSEC	Zimbabwe School Examination Council
ZIMSCI	Zimbabwe Science
ZINATHA	Zimbabwe National Traditional Healers Association
ZANU-PF	Zimbabwe African National Union – Patriotic Front
ZJC	Zimbabwe Junior Certificate

Academic output

Chapters in books

Mpofu, V., Mushayikwa, E., & Otulaja, F. S. (2014). Science Curriculum in the Nziramasanga Commission of Inquiry into Education and Training: The Missing Link. In Madondo. M. M., Museka, G. & Phiri M. (Ed). *The Presidential Commission of Inquiry into Education and Training (Nziramasanga Commission): Implementations, Successes, Challenges and Opportunities.* (pp. 141-161). Harare: The Human Resource Research Centre of the University of Zimbabwe.

Papers in refereed journals

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1 CHAPTER ONE: ORIENTATION

> Traditional [indigenous] knowledge systems should provide sources for the curriculum needs to our societies and such knowledge should be infused into the main school curriculum (Cultural Policy, 2004).

1.0 Introduction

This study explored the possibilities of integrative classroom science (ICS), that is, integrating indigenous knowledge into western-oriented classroom science at Junior Certificate level in Zimbabwe. This is in line with the government of Zimbabwe's current position on the issue of indigenous knowledge and the main school curricula as reflected in the Ministry of Education, Sport, Art and Culture policy document of 2004. Section 33 of the 2013 amended Act 20 Constitution of Zimbabwe justifies this movement on the grounds of preserving, protecting and promoting cultural identity and sovereignty (Constitution of Zimbabwe, 2013). Many stakeholders in science education the world over see this movement as a way of addressing classroom science problems experienced by the classroom enterprise, particularly which comprised of teachers and learners of cultural backgrounds other than the western (Aikenhead & Jegede, 1999). To introduce this study, I first discuss the moment that triggered my interest for undertaking it. I blend my discourses with literature to provide a background for this study. I then discuss the problems that led to my research questions. Next, I discuss the rationale for this study after which I wrap up these discussions by my operandi parameters within the organisation of the chapters and give concluding remarks.

1.1 My epiphanic moment

I get a smile on my face when I recall the "epiphanic moment" (Denzin, 1989, 2009) that triggered a strong need in me to undertake this study. Denzin's notion of "epiphany" describes and expresses memorable moments akin to "*aha"* moments. In simple terms, these are moments of significant experiences in one's life that mark turning points in one's understanding or perceiving of something. The turning points emanate from a new insight into something, a phenomenon, another person or one's own self. This epiphanic moment, grounded in the interactions of my "three lives", namely, home, academic and professional, gave me sudden insights into and discovery of the possibilities of integrating knowledge

rooted in my culture into western[1] classroom science in my home country, Zimbabwe. Up to now, four years down the line, this moment remains vivid in my memory as if it happened yesterday.

Throughout these "three lives" of mine, it had never crossed my mind that knowledge, rooted in my African cultural ways of living, could be part of any school curriculum, moreover, as a science teacher. The science curriculum has always been western oriented. I had been schooled, in both secondary school and tertiary education, to understand science as a distinct body of knowledge that had nothing to do with my culture. The West compartmentalised and institutionalised this knowledge and called it science. This western science excludes spiritual matters that are at the heart of indigenous knowledge (Semali & Kincheloe, 1999). The classroom science I was taught, and am now teaching to pre-service teachers, was drawn from this western science. Learning this western science at school and colleges did not mean that I discarded my African ways of knowing, but rather amounted to contextually separating the two approaches. In this way, my home and school lives had always run parallel to each other. This separation later on threatened my professional life as detailed below.

In January 2007, I joined the science teacher education department at Bindura University of Science Education (Bindura University)[2], in Zimbabwe. I had served as a head of high schools in the then Ministry of Education, Sports, Arts and Culture now the Ministry of Primary and Secondary Education (Ministry of Education, see footnote 2 below for this shortened label of this ministry), for thirteen years. Prior to this position, I had spent seven years teaching science subjects (biology, chemistry and physics) and related syllabi at secondary school level.

A syllabus is a curriculum document that guides the classroom practices of a teacher (Mpofu, Mushayikwa, & Otulaja, 2014b). The science subjects in the syllabus were, in the past, called by different names such as integrated science, core science, general science and extended science. In Zimbabwe, subjects that combine physics and chemistry only are called either physical science or combined science. The disciplines of physics and chemistry are also offered as standalone subjects. These subjects were offered for the first four years of post-

[1] I use the descriptor "western" in characterising nouns such as science, knowledge, people and curriculum to show the worldview that is the basis of these issues. The term "worldview" is discussed in detail in Chapter Two.

[2] I use shorter phrases in parenthesis thereafter to avoid overusing acronyms, to enhance readership and to minimise word count.

primary education, referred to in Zimbabwe as ordinary level[3]. I had also taught chemistry at advanced level that is a two-year post ordinary level course.

When I joined Bindura University, I was asked to design and teach a science methodology course entitled "Advanced Pedagogics" to in-service teachers without any induction or orientation at all. In line with the departmental policy, I presented the course outline I had designed in a board meeting for approval. My course outline was disapproved on the grounds that it was silent on the issue of indigenous knowledge. It was, therefore, limited. I was advised to revise it in line with indigenous knowledge that was a growing trend in science education worldwide.

I left the meeting with deep concerns. "Indigenous knowledge, what is this?" I asked myself as it was the first time I had heard about it; not that I had no knowledge of this culturally grounded form of knowledge, but rather because the construct "indigenous knowledge" was new and foreign to me. I do not recall ever making reference to indigenous knowledge or questioning the nature of the syllabi. Moreover, in my twenty years of teaching as both a science teacher and teacher educator, I had taught the subject the way I had been taught, that is, with western-grounded content and pedagogy. Actually, I did not see anything to question about the nature of these syllabi as this was the way I had learnt the subjects throughout my school and college days. And now, the departmental board was directing me to integrate indigenous knowledge into the methodology curriculum. At that time, I had no idea of what indigenous knowledge content to include in the methodology course and how I was to teach it.

Looking back now, I understand that my failure to comprehend indigenous knowledge in the context of science pedagogy was linked to my limited disposition to teaching such knowledge. Snively and Corsiglia (2001), Oddora Hoppers (2002) and Ogunniyi (2004) are all in agreement that such a challenge is widespread among science educators whose schooling and training is western-oriented.

I feared losing my job on the basis of failing to design an appropriate course outline. I was on probation and this was my first month at Bindura University. I worried for days and weeks. Then I started reviewing and reading literature on indigenous knowledge and science. In my reading, I discovered several concepts that were closely related to indigenous knowledge.

[3]A colonial legacy subject-based qualification conferred as part of the General Certificate of Education which was introduced as part of British educational reform in the 1950s.

Battiste (2002, p. 7) lists them as: indigenous knowledge, folk knowledge, local knowledge or wisdom, non-formal knowledge, culture, indigenous technical knowledge, indigenous ecological knowledge and traditional knowledge. It also dawned on me that the myriad descriptors related to indigenous knowledge systems (IKS) are a consequence of the lack of a clear-cut definition of this knowledge form that is rooted in the home cultures of indigenous people. I became interested in the subjects of IKS and indigenous knowledge and, at that time, used these two terms interchangeably. This conflation was confirmed by indigenous scholars like Ogunniyi (2007a) and Snively and Corsiglia (2001) who use them synonymously. I have, however, in this study, adopted the different but related meanings of indigenous knowledge systems and indigenous knowledge. I refer to IKS as a system of interlinked knowledge forms rooted in culture (Vhurumuku & Mokeleche, 2009) which is the foundation from which indigenous knowledge for classroom science can be drawn (Òtúlàjà, Cameron, & Msimanga, 2011). Since then, I have come to realise that the key to my understanding of IKS and indigenous knowledge lies in understanding the term "indigenous". The scholarship of Battiste (2002), Oddora Hoppers (2002), and Snively and Corsiglia (2001) has taught me that this term – indigenous – expresses something rooted in the cultures of native communities. Oddora Hoppers posits that "indigenous" means the cultural roots or something innate to and an integral part of culture. It, therefore, relates to particular locales and regions (Loubser, 2005). Oddora Hoppers (2002) further made me realise that knowledge referred to as "indigenous" exists in different trades and systems of indigenous ways of life such as hunting, fishing, medicine, building, farming and socio-economic values, among others.

Further, I learnt that the coming of colonialism in Zimbabwe, like in other several indigenous nations, promoted western forms of knowledge at the expense of indigenous knowledge. This colonised vantage position rendered indigenous knowledge as primitive, backward and non-science (Shizha, 2010). For this reason, indigenous forms of knowledge had no room in science and were therefore excluded from the school curricula of most former colonised nations (Hewson & Ogunniyi, 2011). Upon attaining independence, many of these indigenous nations formulated integrative policies across several fields inclusive of science education and health in efforts to preserve, protect and promote cultural identity and home-grown development. Despite reading about this in literature, I did not really believe in teaching indigenous knowledge in a formal classroom. My disbelief was strongly rooted in my western oriented education and teaching practices. Moreover, I had always lived my "three lives" in parallel with each other and I wished to keep it that way. I was convinced that science had

nothing to do with my culture. Against my beliefs, but in an effort to keep my job, I added to the preamble of my course outline a statement about integrating indigenous knowledge in teaching how to teach science. My course outline was then approved in a special departmental board meeting. I have to confess here, however, that, for the next four years, in all my teaching of this course, I made no reference to indigenous knowledge or indigenous knowledge systems. I continued to teach science (chemistry) in the traditional way, the way I had been taught. But I now felt guilty about this and found comfort in realising that, from earlier integrative classroom science studies, other educators, in different contexts, portrayed the same negative attitudes towards this policy. For example, Shizha (2007) and Owuor (2007) in their studies in Zimbabwe and Kenya respectively, identified negative attitudes of teachers towards the teaching of indigenous knowledge in their science lessons as one of the major obstacles for the successful implementation of integrative classroom science policies.

My doctoral journey from July 2011 marked my turn-around point in understanding the relationship between IKS and indigenous knowledge, not only in relation to western classroom science, but also to science in a broad sense. In my search for a suitable area of study, I was largely influenced by the methodology course outline experience I have presented above. I had deliberately avoided literature on indigenous knowledge as I had pre-judged that indigenous knowledge and IKS areas were not options for me to study. In one of my early meetings with the supervisor of my doctoral studies, he suggested indigenous knowledge and classroom science as a possible area of study. I immediately said "**NO**" to his suggestion. Going down my memory lane, I recall that, by then, I was convinced that this was not an area of study for me. I wanted to do something that I thought was "scientific". To me, at that time, indigenous knowledge was not "science" but culture. However, literature on multicultural science later convinced me that science is rooted in culture (Snively & Corsiglia, 2001). As a result, there as many sciences as there are cultures in the world (Ogawa, 1995). Therefore, as Aikenhead (1996) contends, western science in itself is one of these sciences which is rooted in western cultures. With determination, I continued with the literature review process, for the purpose of developing a topic in my defined "scientific" area of curriculum and instruction.

It was during this literature review process that I incidentally came across Hewson, Javu and Holtman's (2009) article: "The Indigenous Knowledge of African Health Practitioners and the South African Science Curriculum". This article offered me a new experience that caused great excitement and fear. I got excited because African/traditional healing was one of my father's multiple trades. My trepidations were centred on whether this could become a reality.

I grew up using indomedicine[4]. I still use and value it today as and when necessary. This does not mean that I negate and dismiss western medicine. I value and use both indigenous and western medicine alongside each other. However, my use of indomedicine had always been in my private life. I had never dreamt of the possibility of this African way of living and knowing becoming part of the school science syllabus. I recalled the designing and teaching experience of the methodology course at Bindura University, and an "*Aha*" moment came to me. Feeling guilty over my actions in the previous four years, I felt a strong drive to understand more about IKS, indigenous knowledge and classroom science. The urge to embark on indigenous knowledge and classroom science research grew stronger and the decision to do a thesis on it was finally made. I felt that no other person was better positioned to undertake this study, in particular the indigenous knowledge of plant healing (IKoPH), than myself who had a father who practiced indigenous healing.

On digging deeper into literature on indigenous knowledge and classroom science, I realised what Ogunniyi (2007a) had observed: that the integration of these two knowledge corpora is complex and problematic. In some parts of the world, concerted efforts to bring indigenous knowledge into science curricula can be traced back over the past thirty years (Guilmet, 1984; Ogunniyi, 1988). In many of these nations where it was attempted, these efforts have not culminated in successful implementation of policies and this endeavour has largely remained more of an ideal rather than a reality (Ogunniyi, 2011). Literature highlights barriers that are unique to teachers linked to this ordeal worldwide. These include: limited understanding of the nature of IKS and indigenous knowledge (Snively & Corsiglia, 2001), insufficient indigenous knowledge content and pedagogically fit strategies for teaching it (Ogunniyi, 2007a), limited indigenous knowledge documents (Sithole, 2007) and attitudinal problems (Ngara, 2007; Shizha, 2007). All these challenges can largely be traced to the point where most of the teachers, both in their capacities as learners and teachers of science, have been educated in western-oriented systems. Western ways of knowing, that is, both knowledge construction and its teaching-learning, differs remarkably from those of indigenous knowing. In addition, most nations' textbooks and policies, which should inform teachers on what content to teach and how to teach it, are not readily available (Òtúlàjà et al., 2011).

[4]I coined this term from the phrase indigenous (traditional) medicines and use it specifically to mean the plants used to prevent and treat different ailments and conditions, their collection and preparation into medicine and their use.

I looked at all these problems and found that they acted as strong indicators for the need for guidelines on what indigenous knowledge to teach and how to teach it within local contexts, such as Zimbabwe. I actually came to regret not being able to learn western science alongside my African knowledge (indigenous knowledge grounded in Africa cultures) in a school context, particularly that of indigenous medicine in which I have a strong background. I strongly felt that if my African knowledge was part of my science curriculum, I would be able to explain the science behind plant healing from both indigenous and western health perspectives. Ogunniyi (2007a), in his Contiguity Argumentation Theory (CAT), describes such learning outcomes as equipollent. I realised that the reason I was not equipollently disposed in my science teaching was because I had been taught science from a single western perspective. This realisation brought fresh insights into possible reasons, which have been noticed from the late eighties, for the decline in the number of students enrolling for science at higher secondary and tertiary levels in Zimbabwe (Mpofu et al., 2012). As literature reveals, these science enrolment problems, which are also noted worldwide, are associated with the complex and alien nature of science taught to indigenous learners (Aikenhead, 2001; Aikenhead & Jegede, 1999; Ogunniyi, 2004). Research in some areas, for example, the study of indigenous knowledge and education conducted by Klein (2011) in Namibia, has shown that integrative classroom science enhances relevancy of the western-oriented science that the learners are taught. Such learners have developed interests in the science subject and this has boosted science enrolments. Daily, as I learnt from literature about problems associated with curriculum relevancy in line with integrating indigenous knowledge into classroom science, my desire to contribute to knowledge and the solutions in this field heightened.

My wide and deep reading revealed some grey areas existing between western science and my cultural experiences. My analytical re-look of the curriculum policies and documents on science teaching-learning in Zimbabwe revealed to me that the intentions of integrating indigenous knowledge into school curricula was prescribed as far back as 1980. One of the studies (Dziva, Mpofu, & Kusure, 2011) gave me the insight that nothing about integrating indigenous knowledge into classroom science is materialising in the classrooms. This finding confirmed my own observations to this effect that I made during teaching practice visits in the past thirteen years as tutor and head of secondary schools.

All my experiences above culminated into an "*Aha*" moment for me. It was my epiphanic moment of realisation that, after all, I can contribute to the alignment of my cultural knowledge with classroom science through research. This epiphanic moment was my motivation to undertake this study. The doctor of philosophy (PhD) journey I had just started

provided me with an opportunity to achieve this. It was as if I was awakening from a dream. A month after my last meeting with my supervisor, I went back to him with my proposal to study IKoPH and classroom science. With some surprise registered on his face, my supervisor approved my research area and this marked the beginning of my PhD journey grounded in the problem I identify and formulate below.

1.2 The problem

The inauguration of the new government of Zimbabwe in 1980 brought with it several shifts in educational policies and goals (Edwards & Tisdell, 1989). Major national educational goals that suggested the inclusion of indigenous knowledge into the school curricula were included in these curriculum reforms. This included the goal to adopt a curriculum based on the Zimbabwean cultural context (Matsika, 2012). In the following year, 1981, the government introduced the Zimbabwe Secondary School Science (ZIMSCI) Project (Dock, 1983). In this project with its focus on the development and use of contextualised materials for the teaching of science, I see traces of the integrative classroom science. As a result of several interrelated factors, this ZIMSCI project was discontinued in the mid-nineties. However, the idea of integrative classroom science did not fold with it. The endeavour remained traceable in textbooks identified in Zimbabwe as Focus on Science Books, one to four. The numbers, one to four, relate to the years of schooling at secondary level, referred to as forms in Zimbabwe (See section 3.5.1, p. 97) for the details of this educational context). To date, this integrative classroom science endeavour has been explicitly stated in various policy documents, such as the Cultural Policy (2004).

The Cultural policy (2004) promotes integrative classroom science instruction and the Science, Technology and Innovation policy mandates the Ministry of Science and Technology Development which here I refer to as the Ministry of Technology[5] to develop suitable courses on IKS for inclusion into school curricula (Science, Technology, & Innovation, 2012). These policies update the Junior Certificate science syllabi (1993) currently on offer in Zimbabwe. As shown in Chapter Seven (p. 240240), this syllabus is implicit rather than explicit on the issue of integrative science teaching (Mpofu, Mushayikwa, et al., 2014b). It can therefore be argued that, in Zimbabwe, teachers have long been expected to teach indigenous knowledge in their science lessons. Objective 33 of the new Zimbabwean constitution states that "the state must take measures to preserve, protect and promote IKS …

[5]My use of Ministry of Technology here is for the similar reasons I gave in footnote 2 (p.1) and in recognition that technology involves both science and innovation.

possessed by local communities and people" (Constitution of Zimbabwe, 2013, p. 29). The government of Zimbabwe is therefore taking measures in educational policies on the teaching of indigenous knowledge that are in pursuance of its IKS constitutional mandate. The Ministry of Technology has since been merged with the Ministry of Higher Education and Tertiary Education. The mandate to develop IKS courses for classroom science therefore now lies with the merged Ministry of Higher and Tertiary Education, Science and Technology Development (Ministry of Higher Education for the reasons given in footnote 2, p.1).

The Constitution of Zimbabwe (2013) provides sound reasons for preserving, protecting and promoting indigenous knowledge by not only including it into the school curricula but also promoting it across various systems and disciplines. Notably, the formulators of this policy have not gone beyond its justification, that is, they have not given guidelines on what content to teach or how and where to teach it in classroom science lessons that are currently western-oriented. In other words, teachers have been left to figure this out for themselves. In Zimbabwe, studies show that the integration of indigenous knowledge is not being enacted at classroom level (Dziva et al., 2011). Shizha (2007) made similar findings by studying teachers' challenges when implementing integrative classroom science reform policies in the Masvingo Province of Zimbabwe. These challenges are not unique to Zimbabwe but are global (Hewson et al., 2009; Ogunniyi, 2007a). Such findings give insight on the complexities that educators are likely to encounter in their attempts to transform this curriculum reform initiative into effective classroom practices. In fact, some of these teachers have said that it is difficult for them to teach what they do not know (Mpofu & Muropa, 2015) while others have demonstrated that they have adequate indigenous knowledge that they could bring into their teaching (Zengeya-Makuku, Kusure, Zengeya, & Bhukuvhani, 2013) but have problems with imparting such indigenous knowledge in the classrooms. These teachers lack guidance in the form of documented indigenous knowledge in the classroom science format that includes written teaching materials that constitute content, pedagogy and examples of activities. Where such materials are available, teachers can learn from them how to teach indigenous knowledge within the syllabus in question. Teachers also lack the strategies of bringing this form of knowledge from the community into the classroom. Therefore, my identified research problem is as follows:

> As long as this indigenous knowledge is not documented in formats for classroom science, teachers, despite having some indigenous knowledge, will still be faced with problems of selecting appropriate indigenous knowledge for teaching. Thus, the task of integrating indigenous knowledge into western classroom science as advocated in

> Zimbabwe remains complex, problematic and perennial. It is more of an ideal rather than a reality. The gap between what is written down as policy and the practicalities of implementing such a policy in the classrooms will continue to exist and may even widen. This can be exacerbated by a failure to guide the teacher how to teach this content in a syllabus such as the junior certificate level one.

My intention in this study was to use the case of IKoPH to illustrate how to include this form of knowledge in the teaching of science in Zimbabwe. In doing so, I was guided by the following research questions that I formulated in my proposal and later modified during the process of doing this study.

1.3 Research questions

The initial three research questions that guided and focused me while doing this study were:

1) What knowledge of traditional plant healing can be acquired from Zimbabwean traditional healers?
2) How comparable is this healers' knowledge to that held by teachers and learners?
3) How can this knowledge of traditional plant healing be taught most appropriately in Zimbabwean science classrooms?

"Everyone knows how it is: you can always go back and change your research questions after you find that the ones you started with did not work out!" (Keane, 2005, p. 31). In asserting this, Keane provides justification for the changing of research questions and focus of her thesis. Khupe (2014) also changed a research question in light of insights she obtained from her fieldwork. The changing or refining of research questions during the process of data generation is typical to studies that are interpretive in nature. This is because the data generation process in interpretive research is personal, field-based and iterative. So, as data are generated and concurrently analysed in-field, the researcher engages with the emerging data patterns that give new insights into the problem under study. This can lead a researcher to pursue different questions or refine existing ones.

Refining the questions rather than changing them was the case with my study. I was led to refine these questions from the realisation that participation in my study could not only include healers, teachers and learners. Rather, it involved another category of participants from the community that I identified as "key" participants. This was an additional group to the one I initially proposed that I now identify as "core" participants. These participation categories are described in detail in section 5.2 (p.145) of Chapter Five. Because of this, participation in this study ended up being broader than what I expected which was a narrow

focus on healers, teachers and learners. To cater for this emergent key participation category, I had to merge my first and second research questions by collapsing what they meant to me. It then read: What accessible indigenous **knowledge** of plant healing do participants hold? I underlined the word knowledge to highlight the knowledge focus of this question, which I further separated into two parts as follows:

a) What accessible IKoPH held by participants could be insightful to the knowledge existing in their community of Tendera?
b) How congruent and incongruent is this form of knowledge among these participants?

I expanded my original third question into four sub questions to give a better focus of the term "**taught**". The term "taught" focussed the study into four related parts. The first related to the place in the syllabus learning areas. Since the syllabus guides the teachers' classroom practices, it was important to identify where to place IKoPH prior to teaching it. Such reasoning led to the formulation of the knowledge syllabus placement focus question: Where can this knowledge be taught in the ZJC science syllabus currently on offer? This left me with three more aspects of "taught" to pursue. I identified these as: content, strategy and pedagogy. These two questions, therefore, explored the integration focus of this study. Refining my questions, as discussed above, gave me the satisfaction that I now had a clear focus for the study that included two main questions as re-stated below:

1) What accessible indigenous knowledge of plant healing do participants hold?
2) How can it (IKoPH) be taught most appropriately in science classrooms?

Having refined my research questions, I defined my purpose for undertaking this study.

1.4 My purpose

As the problem under investigation described above shows, integrative classroom science reforms are globally complex and problematic. However, I foresaw that the sorting out of the fluid and multi-layered complexities of human knowledge, experience and thought systems on this issue as a possible sustainable solution to this problem. With the complex nature of integrative classroom science assumption in mind, I explored ways to tackle this challenge with an illustrative case of IKoPH at Junior Certificate level within the Tendera community in the district of Chiweshe that is in the Mashonaland Central Province of Zimbabwe. To assist me in achieving this purpose, I formulated three main objectives drawn from the research questions detailed above. The knowledge objective was to firstly understand and document the IKoPH in Tendera community. This objective was informed by the suggestion

by Aikenhead and Ogawa (2007) that understanding the nature of indigenous knowledge is a prerequisite to attempting to integrate it into classroom science. The next objective I set was informed by Lawton's (1975) view that every culture has valuable knowledge that should be incorporated into the school curricula. I formulated this second objective to draw and document lessons on how some aspects of IKoPH could be taught in the science classroom from the emic perspectives of the participants.

To attain these two objectives, I set a third methodological objective which was to adopt a methodological approach sensitive to the differences between the two knowledge forms (IKoPH and western classroom science) which was the integration phenomenon under study. This was done to understand the nature of IKoPH and how it could be taught in science classrooms through an appropriate methodological approach.

In doing research that involves indigenous knowledge, it "matters who you are" (Khupe, Keane, & Muza, 2013, p.106). If it were not for whom I am, with my three backgrounds of home, academic, and professional, I am convinced that I would not have been able to make the contributions to knowledge indicated in this report. If another researcher had set out to do this research, it is most probable that he or she would have made different contributions because personal background can be regarded as a lens to doing research. I now position myself in this study.

1.5 Who I am

Most academics agree that research is a way of knowing and that researchers and their studies are not neutral. The process of knowledge creation is continuously shaped by socio-cultural experiences, thought and wisdom (Mutua & Swadener, 2004). It is conducted from the particular standpoint of the researcher. My understanding of this position is congruent with that of Skelton (2001) who said that it impacts on the researchers' ways of reasoning, perceptions of self and others. It provides a particular research approach driven by some specific interests within a particular context. Researchers, particularly those conducting research in indigenous knowledge, acknowledge the significance of positionality in research (Lowan, 2012a; Martin & Mirraboopa, 2003). In studying phenomena that involve IKS, researchers' cultural experiences tend to be influential and significant in their adopting of methodologies compatible with indigenous knowing (see Kovach, 2010a; Smith, 1999) as Khupe et al. (2013, p. 106) say: "it matters who you are in doing IKS research", which I describe in the following paragraphs.

I was born and raised in Gwizi village in Chivi. The district of Chivi is in the Masvingo Province in Zimbabwe. I had my primary education (grades one to seven) at a rural primary school where my father was a headmaster and my mother a teacher. This school was approximately ten kilometres from our village home. I spent the first five years of my primary schooling alternating between two homes, our village home and the school residence. We spent weekends and holidays at our family village home and weekdays at our school residence.

My family is large. My father looked after his brothers' children who stayed with us. On Sundays, we attended church, the African Reformed services. During this period, my father was a *mutariri* (an assistant priest). We grew up fairly healthy. I do not recall that any of us was ever seriously ill or hospitalised. My family's health management style, as in most Zimbabwean families, embraces a complementary approach of both indigenous and western medical practices. Our use of indomedicine was never publicised but remained a family secret for fear of being labelled and ridiculed as "witches" or "primitive". I regarded it as a "black box" that I never opened to outsiders.

In my *Karanga* (a Shona ethnic group) culture, the nuclear western-based categories of family do not exist. Family is inclusive of all members of the extended family. In this big family, we relate to each other as *vakoma* (sister), *hanzvanzi* (brother) and *baba/mai vakuru* or *vadiki* (younger or elder father or mother to mine). This large family concept extends to the community level where *ukama* (relationships) are developed through totems and marriages. The notion of *ukama,* as Gelfand (1981) realised, encapsulates brotherliness, love of one another and sharing among members of a clan for the betterment and survival of all, more so in difficult times. I experienced *ukuma* in my school, my home community and in my village community. This also applied to teachers who came from other parts of Zimbabwe, like Mberengwa. These teachers were accommodated in the same *ukuma* way so that they became part of our extended family. These teachers showed me that they never felt like strangers in the community where they worked. Even to date, embracing western concepts of cousin and niece relationships, which connote distant relationships or no relationship at all, invites isolation from the rest of one's people as a form of punishment.

I drew insights from my experience of totem-based *ukuma* to understand the people of Tendera's totemic worldview. This totemic worldview is unfolded in section 4.4 of Chapter Four (p.128). The totemic methodology grounded in this worldview helped me to develop close relations with participants in the Zezuru community of Tendera where I conducted my

study. I came from a Karanga community that is about eight hundred kilometres from the community where I was doing research. Through the developed *ukama* with my participants, I gained an "insider" research position in my fieldwork. Basically "insider" research positions refer to a researcher sharing the same setting and similar attributes with the participants, such as identity, language and experiences (Asselin, 2003). In this study, the basic elements I shared with the participants were my being Shona with a recognised Moyo (heart) totem even though we differed in language, ethnicity and cultural experiences. However, the respect and value for totems held by the people of Tendera enabled me to develop family relations and to gain respectable positions in these families. I made myself known through self-totemic introductions that extended to my husband's family. For example, on first arrival to a research site, the Elders asked me: "Who are you?" I would respond as shown in excerpt 1-1.

> **Excerpt 1-1:** Cultural introductions
>
> I am Vongai Kutsigira Mpofu, daughter of Great healer Semwa of the Moyo Mudumbuseya clan. My mother comes from the Hungwe clan. I am married to a Shava Mutenhesanwa, a nephew of the Shoko Vambire [Appendix H, 21 December, 2013, PEI].

I shared with my participants only the *Shona* cultural identity, and not the dialect and certain experiences arising from our different dialects. This way of introducing myself gave my participants the full cultural totemic and traditional healing context that, I later on discovered, they valued very much (see Chapter Four, section 4.4, p.128) for more detail). I negotiated my insider perspectives through the strength of *ukuma* that cut across all Shona tribes. Based on this approach, I was readily accepted and positioned as a family member through totemic (*mutupo*) ties. I became an insider. This insider status created opportunities for me to access IKoPH that was considered to be top secret and, therefore, a preserve and privilege of family members only.

Our alternating life in the village and the school homes changed in the middle of my fifth grade of primary school in 1975. That year marked the beginning of my father's healing practices. I later learnt that this was an answer to an ancestral calling. This process of becoming a healer had started in my father's childhood through dreams and intuition. It was a kind of spiritual-based apprenticeship. My father's practice of indigenous healing was gained through spiritual divination that means that he was a *homwe* or *svikiro* (medium). In this study, I refer to such spiritually-guided practices as "assisted healing" and such a medium practitioner as an "assisted healer". The practices of assisted healers are controlled by the

spirit that connects him or her to the spiritual world. This is where their label medium originate from, which implies that they mediate the healing of the spirits from the spiritual realm in the physical realm. Assisted healing practitioners do not operate alone. Rather, they use the services of mediators (*vanyai*) who mediate between the medium and the spirit who trances him or her. The mediators primarily act as message conveyors between the spirit and its medium. They also interpret the messages to the people seeking health services from the healing spirit. Because assistance or mediation to such healers' practices is indispensable, I call these practitioners "assisted healers", meaning healers whose practice is based on healing spirits and are therefore assisted or mediated. The assisted healership practices that emerged in this study are detailed in section 6.4.2 of Chapter Six (p.229).

We started addressing him as *baba* (father) or "*sekuru"* (grandfather) depending on whether or not "*vakasvikirwa nemudzimu*" (he was in spiritual trance of his ancestor). My father's healing practices brought along with it a sudden twist to our life styles. He discontinued serving as an assistant priest in church because of spiritual clashes between African Traditions and Christianity. But he never stopped reading the Bible and praying as a Christian at home. My mother's church visits also became sporadic as she also became preoccupied with her new role as *munyai* (mediator) to my father. The rest of the children and me continued attending church.

Life was no longer the same; our family life had changed. It [family life] was adjusted in order to accommodate my father's after-work assisted healing practices. We started living at our home village full time and travelled the ten kilometres to school during the week. We started waking up earlier than usual to be on time for the first lessons. Many people flocked to our home for medical assistance. At times, we could not sleep as my father worked throughout the night. This became our day-to-day living pattern until I got married. My father continued with his practices up to his passing in August 2011. I played no particular role in my father's practices as this was done in an enclosure called *imba yasekuru* (a surgery) which was within our homestead but a no-go area for children. My ancestral spirit had visibly become part of my everyday life.

Reflecting on my cultural background, I see how it prepared me well to be able to do research involving indomedicine. Because I grew up in such practices, though, at that time, I knew very little about what my father was doing, I now became motivated to know more of his line of practice with each day of conducting of this research. I wanted to learn and understand more about what I had always called a "grey area" of my life. I kept this part of my private

life a secret within my social circles. My interaction with my ancestors through "*mudzimu waisvikira pana baba vangu*" (ancestral spirit who arrived through my father) made me comfortable interacting with the healer participants for my research. I strongly believe that others with no such background would not be able to do or comprehend. I perceived these healers as my father-figures and interacted with them at that level. Working with them brought me even closer to my father than I had ever been before. I sensed and felt his spiritual presence and guidance within me. Though difficult to prove with western science, I strongly believe that the intuitive feelings and senses, which were rooted in my father's spirits, were influential in my ability to work with this very complex category of healers. I believe that they accommodated me because they regarded me as their spiritual daughter. This created a space for me to ask questions which, under normal circumstances in my African culture, would be classified as disrespectful and insubordinate.

The beginning of my father's healing practices not only changed our home life but also our life at school. Today, I carry negative experiences of sour relations that developed between my peers, teachers and myself after my father's healing practices had become public knowledge. I remember losing all my friends and being ridiculed as "*mwana wechitopota, muroyi chaiye*", a *Karanga* expression that translates to "the child of a big time witch". At church, we suffered the same fate. It was always embarrassing to be associated with African tradition within church and school contexts. It was as if we were thrown into the dilemma of choosing either to be the children of my father or denigrate his practices in order to be accepted by others, young or old, who portrayed themselves as Christians and western educated people.

I remember, prior to my father becoming a healer, that I was a sociable and outgoing child but that all changed with the negative experiences I encountered thereafter. My parents taught us to be independent and decisive. They encouraged us to continue going to church and working hard at school regardless of how people perceived us. My parents themselves demonstrated this. I admired my father for his calmness as he continued serving as a school head, which he was now alternating with his healing practices, and, at the same time, creating time for Christian prayers and Bible reading.

Personally, I learned to separate myself from people who made me unhappy. I developed the personality of a loner. I learned to keep my traditional background to myself wherever I went and with whomever I interacted beyond our village and community. Like our father, living in three worlds at the same time became part of us as a family. Probably this is not unusual,

given the CAT's assertion that worldviews co-exist in people and that, at any point, a worldview dominates over the others according to the context (Ogunniyi, 2005).

The heightening of the liberation struggle in 1977 in my area made me see the value in my father's healing practice. The Zimbabwean freedom fighters respected healers, particularly assisted healers. They came to our place for spiritual guidance and medical services. Because of the war, people in my two home areas, the school and village, stopped going to church. They could not even access hospitals and clinics for health services. I think that they were left with no choice other than to seek health services from traditional healers like my father. Those who once ridiculed us for coming from a family of witches sought out my father's services. My relations within school context softened, but I was never the same as I had learnt to be self-independent, secretive and situational.

Unique to me, in my family as a child among others, was my split-personality rooted in my different roles and identities. I have three first names, Vongai, Tracey and Kutsigira, all of which I was given at birth. My identities given by these names depend on the context or occasion and, in turn, determine my roles in those situations. Vongai, my Karanga name, encapsulates the philosophies of *Ukama* and *Unhu*. It expresses the need for people to appreciate one another and live for each other, which also is the basic assumption of *Ukama* and *Unhu*. *Unhu* is an African worldview that affirms the humanity of a person in direct relation with others. It carries positive connotations of fostering and manifesting qualities of kindness and neighbourly support (Shizha, 2009). In African societies, this philosophy of *Unhu* is considered to be a foundation for the building of ethics (Chilisa, 2012). In my name Vongai, which is also public and official, I am appreciative and helpful to others as I am guided by *Karanga* values of *Ukama* and *Unhu*. I expect those people I help to reciprocate this by thanking me as the name Vongai connotes in Karanga.

As Tracey, I tend to act as educated and modern. I acted in this way mostly during my holiday visits to my relatives who lived in up-market urban areas of Harare (then Salisbury). To them, I am Tracey, the upcoming educated one who comes from a "primitive" background. Yet I was just a simple rural girl. In this identity, I dissociated myself from all my traditions and culture. I dropped this make-believe acting when I completed my Certificate in Education course in late 1988s. I now hardly ever identify myself as such, as I realised that my use of this name was closely related to my colonised mentality. This English identity, as I come to understand it now, was influenced by the domination of modern urban culture over my rural culture. The point here is that I was, at that time, living with multiple

identities in different contexts.

My third name, Kutsigira, was given to me after my father's firstborn sister, my aunt, who died when I turned thirty-five. In my Karanga culture, names are not mere labels of identity, but carry a lot of meaning (Pongweni, 1983). This name is interpreted as "you are a family pillar". I was told by my parents that there was a traditional naming ceremony when I was very young where I inherited my aunt's name. At the ceremony, I was told, women sang, and ululated, men whistled in a dancing frenzy as they got intoxicated with the beating of drums and the traditionally brewed beer. I witnessed ceremonies like this on a few occasions that were held in our family when I was a grown up girl.

Reflecting on the past provided me with an understanding that such ceremonies, as described above, are an expression of traditional worldviews. According to Keane (2008), these ceremonies express Africans' foundational presuppositions that shape and guide perception and thinking. In my culturally symbolic name, Kutsigira, I was initiated as an "Elder" joining the family Elders from a very early age. I interacted with family Elders in performing traditional and cultural roles in place of my aunt who was married and lived far away. In identifying me with this name, family members did not call me Kutsigira but VaKutsigira, an honorific title connoting an Elder status deserving of high respect and command. My identity, given to me by this name, is confined to traditional-cultural practices at family level and is never publicised beyond family circles. I never shared what I would have done as Kutsigira in closed traditional activities with anyone. Indeed, this is yet another world in which I am living and I have lived since my primary school days.

My symbolic cultural identity of Kutsigira and my position as a daughter of a healer enhanced my "insider" position in my investigation of the IKoPH aspect of my study. I brought into this research an awareness of the significance of traditional protocols and procedures in accessing data from participants and working with the indigenous participants within an indigenous set-up. I was also conscious that the Zezuru and Karanga, as Shona dialects, had common cultural protocols, not only in relation to issues of the ethical procedures of understanding healing using plants, but, as dialects, they had points of departure. The worlds, which I lived in, alternatively, as the situation demanded, structured my interactions with certain participants from the Tendera community. In a broad sense, my cultural background enabled me to conduct this research under intra-subjective (common) conditions of understanding culture and knowledge with my participants. In reflecting on how I became who I am, I have come to appreciate this experience as it is relevant to my

study. It helped me to make concrete decisions during fieldwork as I found myself acting differently in different situations.

Skelton (2001) acknowledges the complexities, sensitivities and dilemmas that go along with doing intercultural research. This was evident at deep layers of the cultural context as my Karanga roots exposed issues of inter-tribal and cross-cultural dimensions in this study. In carrying out this study, I was aware of tribal variations within the Shona culture but my knowledge of the Zezuru and the Karanga cultural variations was limited. My being Karanga researching with Zezuru participants placed me as an outsider. Moreover, as a Karanga speaker, it is quite probable that I missed out on deep levels of understanding certain expressions and words expressed in high Zezuru language. Participants tended to switch to high Zezuru with regards to deep cultural issues. However, I used a variety of techniques to minimise this challenge as discussed in Chapter Five.

The foregoing outsider account of mine in this study might appear to be contradicting that of insider that I provided earlier on. It evokes the question of whether I was accepted in Tendera community as an insider due to established *ukama* or allowed to work in the community as an outsider due to Karanga/Zezuru dichotomies. However, it turned out that totemic cultural relations are more valued in the Tendera community than tribal differences. As such, it provided me with more of an insider researcher position than an outsider one. I was accepted as a family member more than as a visiting stranger from another tribe. This does not mean to say the outsider realities had no impact on the study, but rather they were eased by insider positioning which created room for probing.

I carried on with my context-based personality into secondary school. I started my first year of secondary education as a boarder at a girl's Roman Catholic mission school. It was closed down mid-year as the Second Chimurenga war intensified. I completed my secondary education at a government co-educational day school in a mining town of Shurugwi (Selukwe before independence).

My professional journey began with the teaching of science subjects after I attained a four year Certificate in Education for secondary school teaching. I taught science as a general subject at ZJC level and in its combined form as physical, combined, and integrated subjects to ordinary level pupils. As an undergraduate, I pursued chemistry as my area of specialisation and graduated with a two year Bachelor of Education honours degree. My master's degree in science and mathematics focused on chemistry education. Over the past twenty three years, I accumulated my professional experience as a science teacher, school

head and science teacher educator. I have worked in rural and urban, day and boarding, and single and double session schools. I am now a chemistry teacher educator at Bindura University. My schooling and teaching have been western-oriented, all this making me occupy an "insider" position with regards to teaching western science. For example, I knew how to interpret a syllabus for teaching that assisted me in my analysis of it in my research.

Until my moment of "*aha*", my three lives (home, academic and professional) were running parallel for over forty years. It was beyond my imagination that my cultural background could be part of any science curriculum or even inform it. But now, here I am, presenting my study in this regard. My current academic activity, as a student-researcher, is mediating and enabling me to cross cultural borders on the teaching of science issues. As a researcher, my background has situated me in an epistemological position of an insider-outsider in which I operate, as suggested by Dwyer & Buckle (2009), in the space between, rather from the dichotomy of either an insider or outsider position. This approach allowed me to be situational, realistic and dynamic in dealing with issues related to either western classroom science, IKoPH or both in pursuance of the objectives of this study.

1.6 Operandi parameters

I set contextual, conceptual, theoretical and methodological operandi parameters in studying the problem I identified. These parameters delimited this study and informed my chapter organisation. I theoretically delineated my study by defining major concepts used in this study as informed by my self-developed CACS model for integrating indigenous knowledge into classroom science. This is discussed in detail in Chapter Two. The contextual discussion of this study is discussed in Chapter Three and serves to delimit the study in terms of the nested context of the community of Tendera and its location. Chapter Four adopts an IAI methodology that delineates the methodological approaches and guided the fieldwork which is described in Chapter Five. It covers the fieldwork aspects of research participants, methods of data generation, data generation procedures and interpretation. Issues of protocol and ethics are also explained. Chapter Six describes the indigenous knowledge of plant healing in the community of Tendera in answer to the knowledge research question one. In Chapter Seven, I discuss the curriculum areas identified for placing selected aspects of IKoPH to start answering research question two. Chapter Eight presents findings relating to integration and fully addresses research question two. Chapter Nine concludes the study with an integrative classroom science process model that emerged from the study together with highlights on research findings, challenges and implications. Recommendations are offered based on

findings of Chapters Six, Seven and Eight.

1.7 In conclusion

Who I am motivated me to undertake this study. It influenced and informed my identification of the problem and formulations of research questions. The knowledge I contributed is guided by my specified purpose of doing this research. Based on who I am, I located my study in Tendera community and selected theories from literature to guide me in doing this study. In this Chapter One, I provided an overview of my study in which I explored possible ways of integrating IKoPH into classroom science at Junior Certificate level in Zimbabwe. 1 have described the research problem. My motivations, the background to the study and purpose of the study have also been described. Furthermore, the delimitations of the study have been explained. I have also located myself in the study in relation to my background. The literature related to this study that I reviewed is presented in the Chapter Two, entitled: Culturally aligning classroom science.

CHAPTER TWO: CULTURALLY ALIGNING CLASSROOM SCIENCE

> Science and science education are cultural enterprises which form a part of the wider cultural matrix of society; and educational considerations concerning science must be made in light of this wider perspective (Wilson, 1981, p. 1).

2.0 Introduction

There is an increasing interest and evidence of literature on cultural perspectives in school science. This chapter reviews literature related to Culturally Aligning Classroom Science (CACS) that is the focus of my study. In fact, this study joins the discourses on cultural perspectives in school science from the case of Indigenous Knowledge of Plant Healing (IKoPH) and classroom science at Zimbabwe Junior Certificate (ZJC) level. For readership orientation purposes, I begin the chapter by presenting my literature review position. I then discuss the CACS model within post and anti-colonial theories because it is the integration framework guiding this study. As such, it provides main themes that link my literature review to the research questions. This review is discussed around three main areas: conceptions of knowledge, forms of knowledge, and western science and IKoPH in the classroom. The literature review ends with a conclusion that is drawn from issues covered across these themes.

2.1 Review standpoint

Hart (2001) describes the literature review as a process involving the selection of documents, published and unpublished, with topic relevant information and effectively evaluating this information relative to the research being undertaken. This involved uncovering the standpoint of the ideas presented on a particular issue, such as a concept or finding, related to CACS, and comparing the views from different sources and/or scholars on such issues. I then conclude the issue by presenting my thoughts on the issue in focus.

The five functions of literature reviewing (Merriam & Simpson, 2000) informed my focus and review process. These are: (1) foregrounding the study; (2) conceptualising it; (3) demonstrating how it advances knowledge; (4) informing its methodology; and (5) providing a basis for interpreting its data and findings. Cognisant of the fact that these five functions are overlapping rather than fixed, I adopted a continuous review process from the beginning to the end of this study. This approach is supported by Herman, Vizina, Augustus and Sawyer (2008) who say that literature reviews in studies, which are interpretive in nature, are a

continuous process. Because of the overlapping nature of these functions, the literature in each chapter of my study tends to be oriented towards a particular function or functions. In Chapter One, the literature mainly foregrounds my study. In Chapter Three, I contextualise the study with the support of literature in order to conceptualise the problem further and inform my methodological development and implementations. In Chapters Four and Five, literature is reviewed to both inform and support my methodological and fieldwork strategies. The reviewed literature in the findings and conclusion chapters mainly support my findings and show how this study has contributed to new knowledge.

This chapter reviews theoretical and empirical literature on the notion of CACS. The focus here is to conceptualise my study problem in terms of its main constructs that are the problems of indigenous knowledge integrating classroom science and to name the contributions to knowledge that the study makes. All literature reviewed served as sources of codes for analysis and interpretation of the generated data as detailed in Chapter Five.

I adopted a thematic review of literature following five basic steps. First, I defined my purpose of revising literature as in the above paragraph. Second, I developed the CACS theoretical framework informing this study. In the subsequent third, fourth and fifth steps, I used the CACS theoretical framework to search for literature, analyse it and report on it thematically. According to Boyatzis (1998), a thematic review can either be deductive/theory-driven or inductive/data grounded. This review uses a combination of the two. The main themes are CACS theory driven whilst, within the major themes, sub-themes are grounded in literature. In the next section, I locate this CACS model within the post- and anti-colonial theories.

2.2 CACS within post and anti-colonial theories

My development of this CACS integrating model was guided by the two research questions raised in section 1.3 (p. 11). The questions also informed my location of CACS in two broad theories of post- and anti-colonialism. CACS was developed from five main constructs of this study that I drew from these questions and linked. These are: knowledge, IKoPH, classroom science, integration and integrated classroom science. In turn, CACS provided a lens for each of these constructs. In this section, I discuss these two broad theories (post- and anti-colonial theories) and the situatedness of CACS within these theories. This CACS location made me operate in the space between post- and anti-colonialism, rather from the counter position of either/or. It provided me with a complementary perspective that allowed me to borrow and/or fuse ideas from these theories. This is because CACS assumes that integrating indigenous

knowledge into western oriented classroom science should end with the visibility of both indigenous knowledge and western science within the same syllabus and classroom spaces (Mpofu, Otulaja & Mushayikwa, 2014). Further reading of this chapter will show the CACS' position in a space where these colonial theories intersect and that pervades the literature discussion.

It was observed in Chapter One that integrative classroom science reforms are basically motivated by the exclusion of indigenous knowledge in school science (see section 1.1, p. 1). Such exclusions, which rendered the western oriented science curricula offered in most African schools culturally irrelevant, were based on the views of the colonial governments that indigenous knowledge was valueless. The colonial governments' ulterior motive was to colonise indigenous people and assimilate them into their western thought systems and ways of living. This study's ultimate aim is therefore to decolonise indigenous knowledge, particularly that of plant healing and the secondary school curriculum. Such a decolonising agenda makes both the post- and anti-colonial theories relevant to this study.

Post-colonial theory seeks to recognise the oppressed indigenous cultures and to liberate them from western scientism. It creates spaces for researchers whose intentions are to decolonise the dominant universal viewpoint in science and science education. For example, Dei (2000) declares that "the learning objective in indigenous knowledges [is] to develop a critical epistemology [that] accounts for the production and validation of critical knowledge for decolonization purposes". This is premised on the assumption that colonialism is in the past as is insinuated by the prefix "post" in the term post-colonialism. Mahuika (2008, p. 10), presents an argument which I considered valuable in my positioning of CACS in post-colonial theory that the prefix "post" attached to the term "colonial" arguably refers to a framework that can be used to move beyond imperialist colonial models. It suggests that this framework provides space for colonised and marginalised peoples to share their own unique perspectives and understandings about the world.

As Carter (2006) has observed, such an interpretation opens up avenues for revisiting western philosophical frameworks, which are not compatible with a post-colonial and globalised world accommodating multiple thoughts. Further, Carter (2006) observes that, in science education, this theory has an "ability to delve into the deeper ravines of referents like multiculturalism, boundaries, identity, representation, and pluralism underpinning theorisations of diverse open spaces to generate different discussions about cultural work" (p. 678). In other words, it accommodates multiple ways of knowledge production and living.

Some scholars, such as Lash and Featherstone (2001), add that, in addition to diversity recognition, this theory of post colonialism provides insights that science education should be concerned with issues of addressing the uneven human and knowledge relations created by colonialism through retributive justice. As for indigenous knowledge and classroom science, this theory opens up spaces for integrative classroom science inquiries. Such researches need to be capable of appraising dominances and subordinations of indigenous knowledge. In this study, this alludes to decolonising IKoPH and the science curriculum.

Speaking on behalf of the indigenous people of New Zealand, which I also found applicable to other indigenous people, Linda Smith (1998) asserts that a "post-colonial" descriptor of the world connotes an end to colonialism. She further says this is problematic because she believes that colonialism has not ended. This is a valid observation given that colonialism today has new twist in the form of neo-colonialism and globalisation that are perpetuating the marginalisation of indigenous knowledge systems. Rather than suggesting the termination of colonialism, post-colonialism could alternatively be interpreted as focusing on creating spaces for critiquing and replacing the institutions and practices of colonialism (Spoonley, 1995). Such interpretations acknowledge the progression of colonialism and provide insights into its accommodation of western frameworks in researching about indigenous people and their knowledge in their settings. This has been observed by Dei (2000, p. 118) who asserts that "postcolonial theorists depend on Western models" in researching about indigenous knowledge. This being the case, I found the theory of anti-colonialism also significant to this study. One major criticism is the assumption that can be drawn of this theory of post colonialism that indigenous knowledge systems lack research frameworks. This is a gap that I believe the anti-colonial theory fills. My use of the term "anti-colonial" is in the same way as Smith (2000) who describes it as the active and proactive resistance from any form of colonialism.

With the recognition that knowledge is never neutral, but rather it serves certain interests (Wane, 2008) of the enterprises who produce it, anti-colonialists, resist colonialism by interrogating the power configurations rooted in ideas, cultures and histories of knowledge production and use. This is a position that requires the knowledge producers to be aware of "the historical and institutional structures and contexts that sustain intellectualism and intellectual projects". They work with alternative or oppositional paradigms that are "based on the use of indigenous concepts and analytical systems and cultural frames of reference" (Dei 2000, pp. 117-118).

As such, the theory of anti-colonialism critiques the imbalances social and power relations embed in the production, organisation, validation and dissemination of knowledge (Dei 2006). This theory informs scholars involved in indigenous knowledge research to adopt indigenous research frameworks from an informed analytical position of land, culture, knowledge and paradigm relationships existing between the coloniser and colonised (Dei 2012, 2006; Wane, 2008). It allows academics, including research students like myself, to appraise the past and current colonial experiences and redress imbalances through reconstructing and transforming academic tenets. These educational frames of reference could include conceptual frameworks, research methodologies, syllabi or curricula documents and policies such as language (Dei, 2012). Ultimately, using this theory in research potentially gives voice to indigenous people, which in turn, lead to the protection, preservation and promotion of indigenous knowledge systems from any forms colonialism, appropriation and expropriation.

As can be drawn from the above discussions, both anti-colonial and post-colonial theories are useful lenses to inform studies whose direct or indirect agenda is decolonising IKSs and institutionalised curricula. However, these theories, useful as they are in guiding multicultural science and science education research, are basically theoretical and short on practical application. This necessitated my development of the CACS research tool that draws theoretical ideas from these two theories of colonialism in a way that is sensitive to knowledge systems, western science and indigenous knowledge.

In the next section, I summarise the CACS model that gave practical research guidance to this study. How this model characterised the integration of IKoPH into classroom science and links the research questions to the literature reviewed is also discussed.

2.2.1 The CACS model

The development of this CACS model, shown in Figure 2-1 below, is detailed in Mpofu, Otulaja and Mushayikwa (2014) as a part of this larger study. As Figure 2-1 shows, this model consists of six main dimensions: (0) the context of study; (1) knowledge; (2) domain of knowledge; (3) cultural crossing; (4) integration; and (5) integrated classroom science (ICS). One or more dimensions of CACS relate to the main constructs of my study. Each of these constructs or dimensions is framed within a theoretical perspective to make CACS a multi-focal lens.

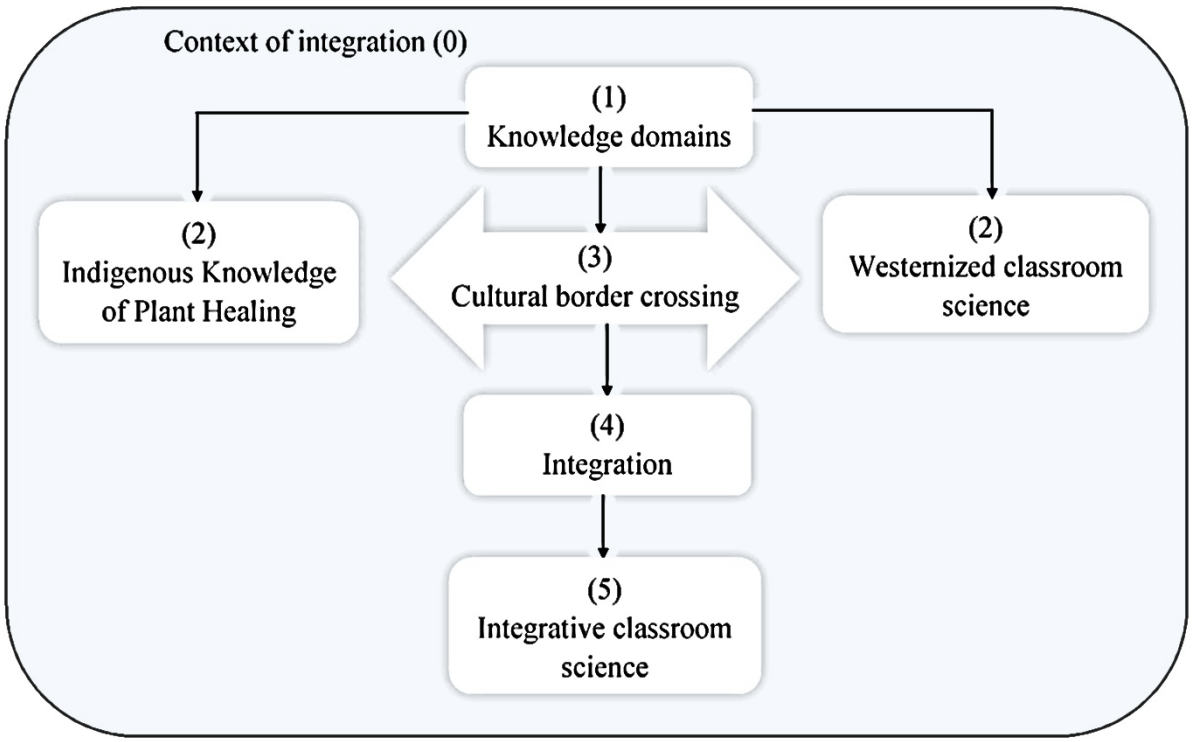


Figure 2-1: CACS model (adapted from Mpofu, Otulaja and Mushayikwa, 2014, p. 237)

Figure 2-1 shows that IKoPH and classroom science, their integration and the outcome are all context specific or place-based. Place refers to a particular locale defined by a land space that provides the people habiting it with relational life experience (Cajete, 2000). In this regard, Culturally Aligning Classroom Science suggests a contextual understanding of integrating indigenous knowledge and western science at classroom level, as a basis for ICS.

Indigenous Knowledge of Plant Healing and classroom science are both domains of knowledge. The dimensions zero and two together constitute the knowledge construct of this study. This CACS model acknowledges that knowledge exists in different places. It provides the Enterprise, Paradigm, Process and Product (E3P) tetrahedral (four-dimensional) model to the conceptualisation of the knowledge construct. Within this model, humans form the enterprise (western scientific, classroom science or indigenous knowledge) that construct knowledge (processes) as informed by their shared worldviews (paradigm) to produce a valuable body of knowledge (product). The concepts of worldview and paradigm are discussed in detail in section 2.3.4 (p. 38) of this chapter below. The Culturally Aligning Classroom Science provides an understanding that, though the tetrahedral dimensions are common to knowledge in different contexts, they also reveal differences. The IKoPH and classroom science are the knowledge domains whose differences are portrayed by their side-by-side separation in Figure 2-1 above. According to CACS, the integration of these two

forms of knowledge need to be based on both a common understanding of the term knowledge and an understanding of the enterprise differences. The indigenous paradigms and processes of knowing are different from those of the classroom enterprise. This is so because the classroom science currently on offer in Zimbabwe is western-oriented. However, there are also possibilities of these different ways of knowing sharing common aspects.

Dimension three of CACS depicts the cultural contexts of these two knowledge forms, IKoPH and classroom science. It frames knowledge from culturally plural perspectives, that is, that there are various ways of knowing that can lead to different or similar knowledge (product). This comes from the cultural and social construction view of knowledge (Shizha, 2007). Different localities construct their knowledge in accordance with their cultures. This means that IKoPH is local or community culture grounded, and therefore context specific. Whilst classroom science is generally portrayed as universal, within this framework, classroom science is also viewed as contextual. This is because the way that classroom science is practiced largely depends on many contextual factors. CACS draws from various sources, such as Aikenhead (1996), to frame the learners' participation in classroom science as involving them in the crossing of cultures, from the home to the classroom science culture. This culture crossing frame comes from the view that western science is one culture and indigenous knowledge is another culture (see Ogawa, 1995; Snively & Corsiglia, 2001). Thus, without efforts to align classroom science practices that are currently western oriented, with the indigenous learners' culture, classroom science will retain the western scientific cultural way of knowing only. The learning of western science will be influenced by the cultural ways of knowing held by indigenous learners. The crossing of cultures without integration means that the learners study a western culture in the classroom without any reference to their indigenous culture. Then, after school, they revert to their home way of knowing. This keeps the two cultures separate and leaves it to the indigenous learners to develop survival strategies in the classroom, which emphasise western science. The classroom science remains colonised and many learners with an indigenous background will continue to struggle to understand the western-grounded scientific content they are taught in the classrooms.

Efforts to align indigenous culture with western science within the classroom space requires the integration of indigenous knowledge into classroom science in order to help the learners harmoniously cross the borders between indigenous culture and western scientific culture. The double arrow in Figure 2-1 depicts this two-way cultural border crossing. The integration (dimension four) lens of the CACS model shows that classroom practices that support or

hinder the learners' harmonious two-way border crossing depends on the pathway adopted. In other words, classroom science practices that incorporate the teaching of both indigenous knowledge and western science need to be underpinned by a specific integration pathway. CACS offers a DPCS or quadruple or four-pathed model of integration that consists of four alternative pathways: the divergent, parallel, convergent and substitutive. It frames integration as a multi-pathed and context-dependent process. The divergent integration keeps the knowledge systems apart and suggests that each knowledge system be taught within its context. It calls for the independent development of indigenous knowledge material. It promises the building of indigenous knowledge reservoirs from which teachers can draw examples for their classroom practices.

The two knowledge systems are brought side by side in parallel integration within the same syllabus and classroom space. Each form of knowledge is, therefore, represented with its full cultural identity. In the convergent type of integration, the hybridised knowledge common to both systems of knowing is placed in the syllabus and taught in the classrooms. Finally, the substitutive integration operates by one displacing the other, the IKoPH displacing western science in the syllabus and classroom spaces and vice versa.

Lastly, the sixth dimension of CACS suggests that the outcomes of integration are shown by the visibility of these two knowledge bodies in integrative classroom science. Mpofu, Mushayikwa and Otulaja, (2014, p. 147) emphasise that "school science is defined by its goals, content and pedagogy – the purpose of teaching/learning it, what to be taught/learnt, how it is to be taught/learnt respectively." In this study, I initially framed classroom science in terms of the three dimensions of purpose, content and pedagogy (PCP or three dimensional classroom science model) which serves as a tool to judge the visibility of both IKoPH and western science in the classroom space.

2.2.2 Integrating classroom science process

CACS characterises integrating classroom science as a sequential and systematic process that aims to align indigenous and western scientific cultures within the syllabus and classroom spaces. The process feature of ICS can be inferred from the order of numbering of the dimensions, zero to five, and the arrows linking them. It suggests that this process starts by establishing the context of integration. Then, it considers how these two knowledge forms can co-exist within both the syllabus and classroom spaces. It concludes by the actual placement of IKoPH into the syllabus that is evidenced by the visibility or reflections of content, pedagogy and activities drawn from this knowledge system in the syllabus.

The usefulness of CACS lies in its multiple foci that provide us with what Keane (2005) calls a multi-sided crystal that enables us to see through and reflect upon different aspects involved in ICS. It links internal thought processes to their practical implementation and outcomes of what can be observed directly in the classroom. This allows for the distillation of the integrated classroom science produced in action, as informed by the researcher's knowledge and the integration of understanding within a local context. The insights arise from individual research situations and depend on what takes place in a particular context of study. Hence, different integration pathways lead to different classroom practices in terms of pedagogy, purpose and content.

2.2.3 Culturally Aligning Classroom Science, research question and literature

Table 2-1 shows how the main constructs of this study are linked to the research questions and the CACS based literature review themes. This summary informed my organisation and the breadth and depth of the coverage of the literature relating to the integration of indigenous knowledge into classroom science main issues.

Table 2-1: Links among research question, CACS lenses and literature theme

Research question	Main construct	CACS lens	Literature main theme
1	Knowledge	E3P knowledge	Conceptions of knowledge
2	IKoPH and Westernized classroom science	Multicultural science	Forms of knowledge
3	Integration	DPCS quadruple PCP classroom science	Indigenous knowledge and Western science in the classroom

In the next section, I discuss literature relevant to the conceptions of knowledge.

2.3 Conceptions of knowledge

For almost two decades, the definitions of the terms knowledge and science as well as from whose perspective have constituted controversial discourses in science education literature. This warrants framing key concepts involved in integrating indigenous knowledge and western science at classroom level in this study for clarity purposes.

2.3.1 Colonised and colonising knowledge

The post- and anti-colonial theories both recognise that colonialism creates knowledge value

disparities, where one knowledge system dominates and marginalise other systems of knowledge (see section 2.2 above). In former colonies, indigenous knowledge has been colonised for many centuries (Oddora Hoppers, 2002) despite the fact that this knowledge existed before western colonisation came to Africa (see Hewson & Ogunniyi, 2011). Colonialism here refers to the settlement of a western group of people in an indigenous country with a clear mission of resource exploitation and assimilation (see Loomba, 2005). The case of the British settlement in Zimbabwe is one example of western colonialism. So, in Zimbabwe, like elsewhere in Africa and in the world, western colonialism marked the beginning of westernised dominance of indigenous people, their knowledge and cultures (Le Grange, 2007). Colonialism relegated the African culture "to the background and concentrated instead on western values which had little relevance to the Africans" (Matsika, 2012, p. 193). More often than not, colonialism in many communities was brutally exercised and left deep scars in indigenous communities (see Battiste, 2002; Loomba, 2005; Oddora Hoppers, 2002).

Prior to the arrival of the Europeans, the African local people were exposed to their own way and systems of life. Western colonialism introduced alternative systems (e.g. knowledge, education and health) to Africans that often conflicted with theirs. It subjugated indigenous Africans' ways of being, knowing and doing. The aim of Colonialism was to displace indigenous systems by force, replacing them with western systems because the colonial governments regarded them as "primitive" and "backward". This devaluation was done by the colonialists to "civilise" the "primitive" Africans through forced assimilative approaches to mark the beginning of the hegemonic relationship between indigenous and western systems. Today, after several centuries of colonialism, there is still evidence of indigenous people's continued practice of their form of knowledge which has become a living legacy in indigenous societies, including Zimbabwe (see Òtúlàjà et al., 2011; Shizha, 2010; Smith, 1999).

2.3.2 Notions of science

I organise this discussion under the three themes- single, plural and hybrid sciences- that emerged from my review of literature in relation to the notion of science. Inherent in these three themes are paradoxes of integrating indigenous knowledge and western science at classroom level as will be shown in ensuing discussions. These contradictions draw our attention to tensions and complexities of integrative classroom science. They also inform us on how to navigate around these complexities in search of ways to overcome them.

The British Association for the Advancement of Science was started in 1831 (Aikenhead & Ogawa, 2007). This association introduced the word "science" into the western way of thinking and knowing. It was borrowed from the Latin word s*cientia,* which means knowledge (Snively, 2009). Since the origin of the western oriented concept of science, this term has been reserved for and associated with the western way of thinking, knowing, and shaping human life. This has caused some scholars, such as Berkes, Colding and Folke (2000) to champion western science as the only science (Semali, 2014). Other scholars tend to dismiss multicultural science as a fad, as heretical, and of no apparent value (Gross & Levitt, 1994; Slezak, 1994). They question the description of indigenous knowledge as science. The concept of western science also marked the domination of indigenous knowledge. Given the high probability that ICS will weaken the universalist dominion over indigenous knowledge, it will be an underestimation to presume that western scientists and their enterprise will take it up easily without any resistance (Mckinley, 2007).

On the basis of science as knowledge, other scholars counter the unilateral position of western science. Instead, such scholars propose that science exists in plural forms from the argument that

> if science is a search for reality and if science is a search for knowledge at the leading edges of the humanly knowable, then there are 'sciences' other than the western science of measurement (Little Bear, 2000, p. x).

Opponents of the universalistic view of science, including Brayboy and Castagno (2008), Cajete (2000) and Ogawa (1995), describe these other sciences as "indigenous". They argue from a multicultural perspective that there are as many sciences as there are cultures of the world because science is found in every culture (Shizha, 2009; Snively & Corsiglia, 2001). As such, western science is found in western culture and is, therefore, a sub-culture of the western culture (Aikenhead, 1996). This means that both indigenous knowledge and western science need to be recognised as powerful but different ways of knowing. Whilst in agreement with this pluralistic description of sciences, other scholars like El-Hani and Bandeira (2008), contend that the term "science" needs to remain tied to a western body of knowledge because describing indigenous knowledge as science is counter to its development as a legitimate and valuable way of knowing in its own right. In other words, indigenous knowledge has a cultural identity that differentiates it from western science. Pressurised by the need to address colonial injustices through science education, scholars for a pluralist viewpoint of science may continue to advocate integration as they perceive it both as a

decolonising and equity status tool (Linda Smith, 1999).

To some scholars, science, as a preserve of western science, refutes and diminishes other knowledges grounded in indigenous cultures (Harding, 1998). It tends to neglect the fact that western science was developed over centuries and continues to develop through appropriation from many other cultures (Aikenhead & Ogawa, 2007). The development of western science included the modification of selected aspects of indigenous knowledge into western scientific worldviews and cultures (see Òtúlàjà et al., 2011). It can therefore be argued that western science is a hybrid or merged knowledge of cultural knowledge elements fitted within western scientific ways of knowing. The meaning of the terms "cultures" and "worldviews" are defined in sections 2.3.3 and 2.3.4 of this study.

Insights from three integration approaches of science are, firstly, that the science and the other (non-science) frame of the Universalists imply the divergent mode. The approaches are kept separate, as the two knowledge forms are non-mixable. The unilateral frame of science recognises and promotes an antagonist hegemonic relationship between indigenous knowledge and western science. It implies the divergent integration that maintains the status quo. Secondly, the many sciences view of the pluralist implies side-by-side or parallel existence with full recognition of each. This perspective recognises the need to value and respect differences in these knowledge bodies in a way that promotes their harmonious co-existence. Thirdly and lastly, hybrid implies a mix of the two knowledge bodies that resonates with the convergent mode of integration. The pursuance of the hybrid approach alone into one common worldview is likely to preserve and promote western scientific worldviews at the expense of indigenous worldviews.

Perhaps one of the most important questions in the discussion around the construct of science in relation to integration of indigenous knowledge and western science is: Which concept of science is suitable for the integration of indigenous knowledge and western science at classroom level? The answer depends on several factors that need to be established through a further review of literature. This needs to be done with CACS' suggested overall aim of integrative classroom science to make classroom science culturally relevant to indigenous Africans that, in this study, are Zimbabweans. Such a goal implies that knowledge is underpinned by culture and necessitates a discussion of the construct of culture in relation to knowledge. This forms the subject of the next section.

2.3.3 Culture and knowledge

Cultures are tied to specific people and places. This is because they "develop from the particular histories, geographic environments, habits, and psychosocial characteristics of a people" (Hewson, 2012, p. 318). As such, cultures vary from place to place. This makes the wide and varied discourse around issues of culture in the literature reasonable. Different people attach different meanings to this construct of culture. This further complicates the issue of culturally aligning classroom science as it raises the question of which meaning would allow indigenous knowledge to be integrated into classroom science. It is therefore necessary for this study to construct the meaning of culture that will provide the basis for understanding the stakeholders' voices and literature discourses about the integration of indigenous knowledge into classroom science. This argument intersects CACS, hence this study, into the space between the post- and anti-colonial theories (see section 2.2 above) that seeks to decolonise and reclaim indigenous voices and their indigenous knowledge. In addition, such a contextualised understanding of the term "culture" will inform decisions on how best to tackle the problematic task of including indigenous knowledge into classroom science without necessarily reversing the ills of colonialism.

I mainly draw from the perspectives of Borofsky, Barth, Shweder, Rodserth and Stolzenberg (2001) and Kato (1976) to frame the concept of culture for this study. Borofsky et al. (2001) define culture in three ways. Firstly, that culture refers to "beliefs, behaviours, and/or artefacts portrayed as developing over time, often towards a progressive end" (Borofsky et al., 2001, p. 433). In this sense, culture is developed and continuously shaped with the progression of time. This perspective of culture recognises it as dynamic, fluid, and constantly shifting (Gutiérrez & Ragoff, 2003). Secondly, "culture is often portrayed as the beliefs and/or behaviours people retain despite interaction with the 'West'" (Borofsky et al., 2001, p. 433). In this sense, culture is resilient because it is retained. This implies that not every aspect of culture shifts with changes in its context, but certain beliefs and actions that form its core are stable and resilient to contextual influences. Interpreting the dynamic and stable features together leads to the conclusion that culture comprises aspects that change as a result of interactions with different cultures (Western or non-Western) and others that remain traceable to historical times to give it identity. Thirdly, culture alludes to "people's shared beliefs and behaviours that distinguish them from others and, at the same time, offer them a sense of shared meaning." Thus, culture is shared among people of the same locality and provides the cultural identity of each individual. It also constitutes a set of beliefs, actions and artefacts (symbols) that are shared among members of a group (Borofsky et al, 2001).

I modelled Figure 2-2 below from Kato's (1976) egg analogical descriptions of culture This representations shows the relationships and interactions between beliefs, symbols and behavioural elements of culture revealed by Borofsky and his colleagues above.

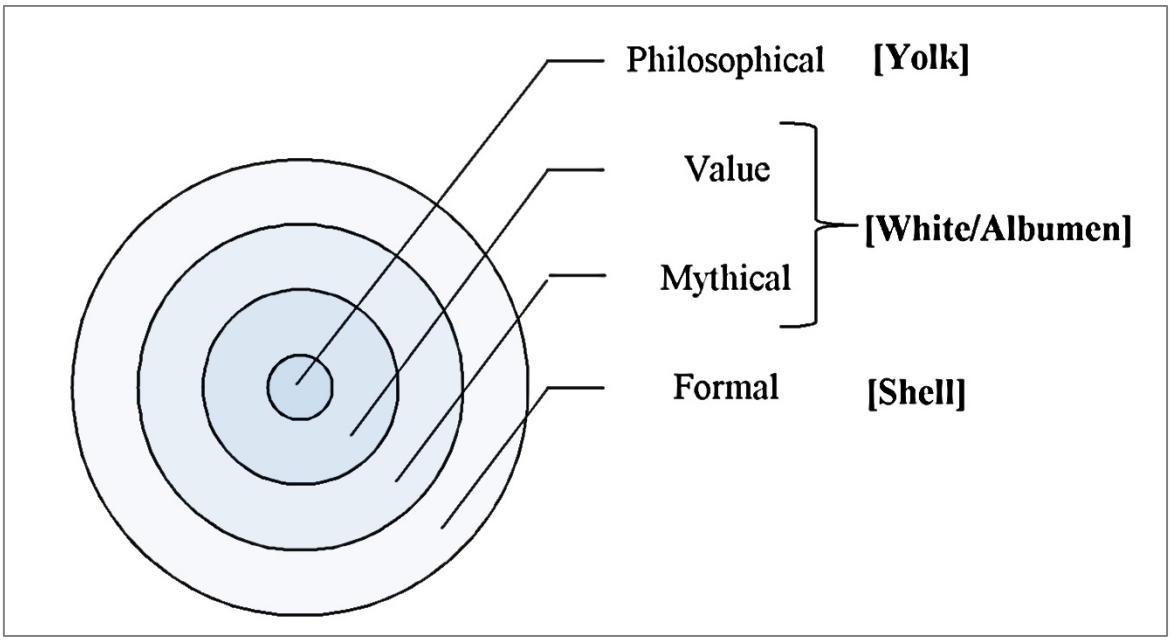


Figure 2-2: Culture egg analogy (modelled from Kato's 1976, egg analogical descriptions)

According to Kato (1976), culture can be imagined in terms of the structure of an egg. Like the shell, white and yolk of an egg, culture can be viewed as comprising three basic layers. The thin shell represents the symbolic or formal level. Like the shell, it is seen by everyone and is tangible and visible and includes artefacts, metaphors, rituals and ceremonies:

> Forms of culture may be manifested in the meanings associated with ceremonies or traditions that have been carried out a thousand years and that define – at least in part – the nature of people (Castagno & Brayboy, 2008, p. 944).

For example, in Zimbabwe, *mukwerere* (prayers for rain) ceremonies date back to ancient times and are still practiced today. They reflect the stable aspects of culture. These different oral forms of culture hold cultural knowledge and evidence of its developed nature. Whilst the core aspects of culture are resilient to change, there are other aspects that respond to socio-politico-economical, technological and historical (SPETH) contextual factors, herein referred to as society context specific factors (see footnote 2, p. 1).

There are a number of examples that evidence the developing, preserving and shifting features of culture that I can draw from my own background as well as the experiences of data generation for this study. One example is that, prior to the introduction of clothes in

Africa, healers were symbolically identified by animal skins associated with their expertise. The introduction of fabric in Africa shifted the use of animal skins to black, white, and red as symbols of ancestral spirits.

The telecommunication sessions I held with healers and Elders are another example. Each of the seven healers, including the community Elders, was in possession of a cell phone that enabled distant communication. In addition, I was allowed to video/audio record some sessions and also take photographs of certain sacred places that, under traditional circumstances, is taboo. I argue that the use of western developed technology within an indigenous cultural sacred context demonstrates the cultural responsiveness to technological advancement. However, the contents of the sessions, such as "spiritual infolding" (*kupetera),* which are communicative patterns in a particular posture for a specific traditional purpose, remained traditional both in oral format, language and action to evidence the retained aspects of culture. Such cultural symbolic processes and activities are detailed in Chapters Four and Five.

Inside the egg as shown in Figure 2-2 above are latent aspects of culture represented by the egg white and yolk. Kato (1976) describes the white as representing cultural values and myths. Myths are people's accepted beliefs in deities, traditional religion and human origins. The values capture the group ethics of what is bad or good and therefore shape the behaviour of the group. An African *Unhu* worldview constitutes an axiological frame of values that ground behaviour in line with the expectations of African communities (Shizha, 2010). It is a multifaceted philosophical construct that scholars describe in a variety of ways. However, all these perspectives tend to converge on three main features of *Unhu.* Firstly, that the community builds good relations among its people through the values of respect, recognition, reciprocity and self-good manners. Secondly, that the preservation of life supersedes economic gains. For example, although it was never said aloud, I now understand that, by raising siblings from our economically disadvantaged extended family, my father was acting on this *Unhu* principle. This leads to the third principle that, in an indigenous Zimbabwean community, you are there because of others (Keane, 2008), which Shizha (2009, p. 144) asserts is embedded in the Shona culture because "the king owes his status, including the powers associated with it, to other people under him". In sum, *Unhu* advances a community's collective approach to life through

> the attention one human being gives to another: the kindness, courtesy, consideration and friendliness in the relationship between people, a code of behaviour, an attitude to others

and to life (Samkange & Samkange, 1980, p. 89).

This does not mean that the philosophy dismisses the existence of individualism and individual needs, as well as conflict, but rather, in line with the complexity theory, it acknowledges the existence of a part in a whole and therefore strives to maintain this holism. It is in this holistic system that the philosophy comes to shape life for the benefit of the entire system. As such, an individual is expected to align or synchronise his/her progressive needs and drives to the benefit of his or her community.

The yolk represents the philosophical level of a culture. The simple definition of philosophy as "the most basic beliefs, concepts, and attitudes of an individual or group" provided by the Merriam-Webster on-line dictionary is sufficient for this study. It answers questions about what gives meaning to life and life's problems. For example, in the indigenous African culture, it is believed that nothing happens by chance. There is also a strong cultural belief that illness or death is rooted in spiritual powers (see Matsika, 2012; Mbiti, 1975; Shizha & Charema, 2011). Similarly, birth, healing and life are believed to be God-given "gifts" that are negotiated by the ancestral spirit on behalf of their protégés in the physical world (Matsika, 2012). So, spirituality in African indigenous communities is a sacred and respected central philosophical aspect of the *Unhu* African worldview. In fact, the sacredness and respect of spirituality cuts across indigenous communities of the world. Indigenous people strongly believe that spirituality holds the dialectical relationship between the living and dead, self and collective empowerment, metaphysical and psychic powers, and healing and wholeness (Dei, 2002). In simple terms, the philosophical layers lie at the heart of culture and hold a set of beliefs that relate to values, realities and knowledge. These beliefs can be interpreted or inferred from observable symbols of culture and inclusive behaviour.

The preceding discussions define culture as a context-specific and complex construct. It embodies knowledge, values, practices, myths and beliefs that are unique to different cultural groups, natural communities like Tendera or instituted structures such as western science or classroom enterprises. In essence, I find it a misnomer to think of culture that exists without people. There is no human race, western or non-western, white, black or coloured, without a culture. It is "the glue that holds the community together" (Matsika, 2012, p. 193). Therefore, knowledge cannot exist outside culture and each form of knowledge reflects a specific culture and embodies the knowledge that it has. Therefore, to separate culture from knowledge becomes difficult as the two are inextricably knotted. In sum, culture embodies knowledge, attitudes, beliefs, values, expectations, skills and norms of a group (Phelan, Davidson, & Cao,

1991). The importance of this understanding for this study is the insights it provides that help to avoid cultural generalities and concentrate on specific cultural issues in investigating a phenomenon that involves such aspects.

Hewson (2012, p. 318) emphasises that "different cultures may have different paradigms" and that "Africans have their own perceptions and conceptions of the world and its paradigms". Her definition of paradigms as "ways of seeing and interpreting the world" concurs with other scholars who have written about worldviews or paradigms. Snively (2009) emphasises that it is necessary to distinguish between indigenous science and western science because they originate from different cultures. Knowledge systems differ in their paradigms, methodologies, logics, cognitive structures and in their socio-economic contexts (Battiste, 2002). This is explored further in the ensuing section 2.3.4 which discusses the worldview construct.

2.3.4 Worldviews and/or paradigms

Like culture, there are many definitions of worldview that are abstracted in the literature. This is not surprising given the close and inseparable relationship between these two constructs (see Hewson, 2012; Kawagley, 2006). It also reinforces the conceptual challenges that the main constructs of this study are bringing into the already complex task of integrating indigenous knowledge into classroom science. Hence, the analysis of this construct becomes the basis of understanding the knowledge bodies (indigenous and western) to be integrated, how they are related and the integration phenomenon itself. It also informs the development of methodological strategies of integrating them in ways that are sensitive to their differences and makes these two bodies visible and respectable in the classroom science. This becomes possible through intersectionally positioning CACS in the space between post- and anti-colonial theory. This is because post-colonialism allows the adoption of research frameworks grounded in western ways of knowing whilst anti-colonial theories advocates for indigenous research frameworks (see section 2.2 p. 23 above). I draw mainly on the worldview conceptions of Cobern (1996, 1998, and 2000), Kearney (1984) and Marsden (1992) to understand the term "worldview" within this study.

Cobern (1996, 1998, 2000) describes a worldview as the culturally dependent, implicit, fundamental organisation of the mind comprising presuppositions (background beliefs) that dispose one's predictable patterns of feelings, thinking, and action. As presuppositions, worldviews describe a person's intuitive or "non-rational foundation for thought, emotion, behaviour and ideas or images about the world and valuable knowledge about it" (Cobern,

1996, p. 584). Presumptions are basically a set of beliefs. The description of worldviews as comprising one's predictable patterns reveals their individual orientation, therefore, in this case, can be referred to as personal worldviews. As such, worldviews shape one's sense of the world, norms and values as well as describing and identifying the self in relation to other elements (people and non-people) of a shared environment (Cobern, 2000). In short, every person holds worldviews, which he or she may be mindful of, or not, which influences what he/she thinks and does (Proper, Wideen, & Ivany, 1988).

The description of worldviews as culturally dependent (Cobern, 2000) shows that they are shaped by culture in different contexts. Illuminating this supposition, Proper et al. (1988, p. 547) describes the acquisition of worldviews as existing "through a variety of influences including the family, media, interpersonal relationships and structures of institutions and the way they function". This implies that worldviews start developing in people at birth and are continuously shaped through life. To the Africans, such worldviews are indigenous and bound to be shared with other people of the same cultural background. This means that worldviews are collective. However, today in African societies, children and adults interact with other worldviews with the exposure to other cultures such as schools, inside or outside Africa, churches and media. It follows that such people acquire additional worldviews that may be unique and personal to them. It is, therefore, not a misnomer to find worldview variations among members of the same cultural group and people holding multiple worldviews. People may express these different worldviews under different circumstances. When they do so, it means that, within that context, the expressed worldview is dominating over the unexpressed (see Ogunniyi, 2004, 2007). It is therefore no surprise that Jegede (1998) observes that some good western scientists in the western scientific enterprise may also be good traditionalists in their African lives. This is because such people draw on their western scientific worldviews in the context of practice and fall back into their cultural worldviews within the context of their homes when called upon to do so.

Reinforcing the interrelatedness of culture and worldviews, Kearney (1984, p.1) describes a worldview as:

> A culturally organised micro-thought: those dynamically interrelated assumptions of people that determine much of their behaviour and decision making as well as organising much of their symbolic creations … and ethno philosophy in general.

It can be drawn from both Cobern's (2000) and Kearney's (1984) perspectives of worldview that decision making is an internal thought system that manifests itself in behaviour. The

assumptions that Kearney (1984) refers to are equivalent to the presuppositions of Cobern (2000) which forms the philosophical cultural core. Further, Marsden (1992) refers to worldviews as:

> Cultures pattern perceptions of reality into conceptualisations of what they perceive reality to be and of what is to be regarded as actual, probable, possible or impossible. These conceptualisations form what is termed the 'world view' of a culture. The worldview is the central systematisation of conceptions of reality to which members of its culture assent and from which stems their value system. The worldview lies at the very heart of the culture, touching, interacting with and strongly influencing every aspect of the culture.

Marsden (1992), in his definition above, makes two main features of worldviews more apparent. In one sense, he re-echoes Cobern's (2000) and Kearney's (1984) views of culture and worldview as interrelated and says that "[t]he worldview lies at the very heart of the culture, touching, interacting with and strongly influencing every aspect of the culture". In addition to worldviews being culturally shaped, Marsden (1992) describes worldviews as interacting and influencing every aspect of culture and reveals that, once formed, worldviews continue to develop and, in turn, also shape culture. Thus, the two, culture and worldviews, relate dialectically.

Secondly, the worldview's multidimensional and complex nature can be drawn from Marsden (1992), Kearney (1984), and Cobern (2000) among others. As a concept of reality, the worldview relates to its ontological dimension, that is, the reality or truth view of nature (Scott & Morrison, 2007). Ontological presumptions are inseparable from the worldview's epistemological (what knowledge is) and methodological (ways of developing such knowledge) dimensions. As a foundation of what counts as valuable knowledge (Cobern, 1996), the worldview places emphasis on its epistemological dimension. Epistemology has to do with the philosophy about nature and scope of knowledge (Moreland & Craig, 2003). The generation of this knowledge needs to be commensurate with the epistemologies and ontologies of generators' worldviews. Ultimately, the product known as knowledge reflects these methodological, ontological and epistemological presuppositions. This methodological aspect of the worldview is salient in Marsden's description of a worldview as "the central systematisation of conceptions of reality to which members of its culture assent and from which stems their value system." In essence, this means that people as individuals or in groups are governed by their agreed values in their searches to develop understandings of reality. From this worldview perspective, the generation of knowledge is value laden and

therefore axiological presumptions are inherent in a worldview. Most importantly, these five components (the ontological, epistemological, methodological, rhetorical and axiological philosophies) of a worldview are expressed and communicated in the language of the cultural group or enterprise. Language is, therefore, central to cultures and worldviews (Gardner, 2000). It holds and manifests cultural worldviews, particularly those that are indigenous (Ntuli, 2002) as the United Nations website for cultural diversity says:

> Language not only communicates, it defines culture, nature, history, humanity and ancestry. Preserving endangered languages is a vital part of securing the culture and heritage of our rich human landscape. Language keeps traditions alive, it inspires knowledge and respect about our past and the planet on which we live, and it links communities across borders and beyond time (United Nations, 2008).

The above characterisation of worldview informs my working definition of a worldview as a culturally grounded set of ontological, epistemological, methodological, axiological and rhetorical philosophies about the world which is held individually and/or shared among members of a cultural group (Mpofu et al., 2014b). This meaning of a worldview shows the complexities of the construct of worldview besides the simplified descriptions of a worldview as "ways of seeing and interpreting the world" (Hewson 2012, p. 318) or "consisting of the principles we acquire to make sense of the world around us" (Kawagley, 1995). In my definition, the principles referred to imply the philosophies that lie at the heart of a culture. In this regard, philosophical assumptions of knowledge, reality, language, process and values make up the worldviews of different people and groups. Each of these dimensions reflects the cultural group or enterprise's worldview. Though African indigenous worldviews and Western scientific worldviews are basically different, it is possible that an indigenous Zimbabwean, like myself, can hold both or even more worldviews (see my positioning in Chapter One). This being the case, and tied to colonial effects of western science domination over indigenous knowledge, it follows that access to indigenous knowledge and worldviews for classroom science can be a daunting task. It informs us of the need to create conducive environments, which will enable the learners, teachers or healers to share their indigenous knowledge and worldviews.

Paradigm is another concept that is in use in science education research and teaching. It is closely related to that of worldview. However, these terminologies have originated from different disciplines. On one hand, the use of the term worldview in science education is traceable to anthropology (see Linda Smith, 1999). On the other, that of paradigm is rooted in the history and philosophy of western science. Kuhn in the *Structure of Scientific Revolutions*

(1970) characterises his concept of a paradigm in three ways suggesting its similarity to the concept of worldview. In the first instance, he says that "a paradigm governs, not a subject matter but rather a group of practitioners" (Kuhn 1970, p. 180). This definition shows that, like a worldview, a paradigm is shared among members of the western scientific enterprise. Secondly, he describes a paradigm as a "disciplinary matrix" which means "constellation of group commitments" (Kuhn 1970, p. 181) composed of four main components. These, as Ogawa and Aikenhead proposes are:

> (a) symbolic generalizations (e.g., vocabulary and equations), (b) metaphysical paradigms …, (c) values that guide a judgment concerning evidence and theories, as well as values that scientists draw upon to reach a consensus; and (d) exemplars (Aikenhead, & Ogawa, 2007, p. 545).

Kuhn's third description of a paradigm emphasises the exemplar element in the disciplinary matrix. As such, he contends that, as an exemplar, the paradigm refers to "the concrete puzzle-solutions which, employed as models or examples, can replace explicit rules as the basis for the solution of the remaining puzzles of normal science" (Kuhn, 1970, p. 175). This exemplar notion of paradigm implies "a sample problem solution which can be extrapolated to other problems" (Turnbull, 2000, p. 8).

Kuhn's three perspectives of paradigms explain that a paradigm is a shared scientific cultural framework concerning truth, knowledge and its production. It is a basis of further understandings of the world through human activities. Like a worldview, a paradigm is basically collective and shared among members of the same enterprise. It embraces values and metaphysics that link it to culture like a worldview. Other points of similarity include references to the group assent in knowledge generation and the possibilities of holding personal paradigms in addition to the enterprise paradigm. So paradigms, as worldviews, do reflect and influence the thinking of individuals and enterprises. Similar to worldviews and culture, paradigms have aspects that are responsive to society context specific factors and others which are resilient. This examination of the term "paradigm" forms the basis of using it interchangeably with the concept of worldview. In this regard, this study's working definition of a worldview proposed above also to the term paradigm. Paradigms or worldviews consist of philosophically grounded ontologies, epistemologies, methodologies and axiologies that are rhetorically expressed in the language of the cultural group or enterprise. I use the acronym POEMAR, coined from the first letter of each dimension, to make reference to the interactive components of worldview or paradigm. This coinage avoids over-wording in the ensuing references to worldviews or paradigms.

Le Grange (2007) identifies two perspectives of knowledge or science that are tied to Kuhn's characterisation of a paradigm as a disciplinary matrix and an exemplar. Firstly, science, as a representation, relates to the disciplinary matrix view of paradigm, particularly the symbolic generalisations. These are the scientific "abstractions, such as theories and laws and the idea of a scientific method" (Le Grange, 2007, p. 587). This aspect includes epistemic terminology of a particular paradigm (disciplinary matrix). It manifests and reflects the values and metaphysical components of the disciplinary matrix from which it is drawn. Comparing this worldview analysis to the E3P model of knowledge aligns the representation aspect to the product knowledge. It is an outcome of the processes (methodology) of knowledge production by people belonging to the same enterprise as guided by their philosophy of truth (ontology) and cultural values (axiology).

Le Grange (2007) presents a second performance perspective of knowledge from the view of a paradigm as an exemplar. It alludes to science as "the doing of science" by recognising that "science is a human and social activity that is messy, heterogeneous and situated" (Le Grange, 2007, p. 587). This frames science as a methodological process rather than the outcome, representation or product of a process. "Doing" science is therefore a human function that is cultural and context specific, therefore, diverse. It resonates well with principles of the multicultural science of many sciences as opposed to one science (see Cobern & Loving, 2001). As discussed earlier on, such a view allows the learning of science in classrooms and/or from research from alternative perspectives.

The foregoing discussions have provided a frame of the constructs – colonialism, science, culture, and worldviews – principal to the knowledge forms that constitute the integration phenomenon under study. Indigenous Knowledge of Plant Healing and classroom science make up the knowledge integration phenomenon explored and are grounded in different knowledge forms, cultures and worldviews. IKoPH is a form of indigenous knowledge. Classroom science is drawn from western science. These knowledge forms can be understood in two categories. One category is indigenous that comprises of IKoPH and indigenous knowledge. Classroom science and western science fall into the other category which is western. As such, these four types are the forms of knowledge relevant to this study. Furthermore, the literature reviewed in this section is insightful, not only of the conceptual complexities shrouding this knowledge integration phenomenon, but also of the differences in worldviews. This leads to the examination of these knowledge forms and their relationships within and across their genre in the next section.

2.4 Forms of knowledge

The discussion of the literature reviewed related to the forms of knowledge in this section is organised around three main themes: (1) Indigenous knowledge and Indigenous Knowledge of Plant Healing; (2) Classroom science as an image of western science; and (3) Knowledge relationships.

2.4.1 Indigenous knowledge and Indigenous Knowledge of Plant Healing

There are a variety of terms that are offered in the literature and that are used interchangeably or related to indigenous knowledge. These terms fall into three categories. In the first category, the descriptor of this knowledge as "indigenous" is replaced with alternatives, such as traditional or traditional ecological, local knowledge, folk or inter-generational (see Battiste, 2002; Castellano, 2000). In the second category, the term "knowledge" is replaced by that of science so that reference is made to indigenous science (Ogawa, 1995) rather than indigenous knowledge. In the final category, indigenous knowledge is described as culture or science (Battiste, 2002). Each of these descriptors connotes a different focus. For example, the descriptor "traditional" emphasises the distant past and the integrational transmission of this knowledge. This focus might emphasise ancient roots that characterise this knowledge form as static and underplay and overlook its dynamism in response to societal context specific factors. The other term, "local", underscores the indigenous knowledge's place-based nature but does not directly link this knowledge to its traditional and cultural roots. This is because not only indigenous knowledge is local but all knowledge forms are local and located/situated, therefore each has a place and creates a space (Le Grange, 2007; Turnbull, 2000). In recent literature, the descriptor "indigenous" has become popular. This term underlines the roots of this knowledge body to native cultures or people other than those with a western background (see Oddora Hoppers, 2002). As such, it disregards the fact that there is also indigenous knowledge of the western populations (Òtúlàjà et al., 2011). The significant difference between the indigenous knowledge of western and non-western communities is that non-western knowledge is still cherished by its owners while the majority of the western people, particularly the scientists, have abandoned their indigenous knowledge. In this study, I have adopted the term "indigenous knowledge". However, my use of this term relates to the knowledge alternative to western science that was originally developed in non-western cultures.

I characterise it holistically as the native, traditional and local knowledge generated from indigenous cultural ways of knowing by indigenous people. This perspective of the term

"indigenous" recognises existence from ancient times and modifications over time. In Zimbabwe, such knowledge has mostly been retained in rural communities, such as Tendera. It has been passed on through generations by cultural means. However, some of its aspects have and are changing in response to cultural changes influenced by societal context specific factors while others are retained (see section 2.3.3 above). My focus is on African knowledge that has been colonised by the western people, particularly the indigenous knowledge of plant healing. So, my use of the term "African knowledge" refers specifically to indigenous knowledge related to African communities.

The varied meaning of this term (indigenous knowledge) in the literature worsens the conceptual related challenges of integrating African knowledge into classroom science. Such diverse meanings are traceable to its multidimensional nature that offers various angles from which to define it. I analyse Vhurumuku and Mokeleche's (2009) concept of indigenous knowledge first. Then I use the views of Castellano (2000), Warren and Rajasekaran (1993) and Nakashima (2000), in that order, to establish differences and similarities between the indigenous knowledge perspectives that are linked to the knowledge perspective of the E3P model to provide a comprehensive framework of indigenous knowledge used in this study.

Vhurumuku and Mokeleche (2009) describe indigenous knowledge as "a set of understanding, interpretations and meanings of the world grounded in a complex cultural matrix". To these authors, this cultural matrix is the core of IKS. This abstract definition can be construed in parts that individually characterise the concept of indigenous knowledge. Firstly, as a way of making sense of world, indigenous knowledge becomes a worldview or paradigm. This is what the E3P model describes as "paradigmatic knowledge". This explains Proper et al.'s (1988) contention that the paradigm is closely linked to knowledge. According to the tetrahedral knowledge model, the "what" knowledge is the product, the "how" is knowledge processed, "by whom" the knowledge is developed is the enterprise and the "why" is the paradigm. The "why" is the logic and reasoning that is shaped by the worldview. Based on the constructs of worldview discussed above, the worldview as knowledge refers to knowledge of life, culture and meaning that manifests the underlying issues of POEMAR.

Secondly, indigenous knowledge is grounded in IKS. Thus, indigenous knowledge is a component of IKS (Hewson & Ogunniyi, 2011; Mpofu, Otulaja, & Mushayikwa, 2014). Just as African human families can be viewed in terms of a family tree whose trunk branches into different components, the term "indigenous knowledge systems" is the genus and holds different forms of knowledge. The tree roots are representative of the indigenous knowledge

system and, therefore, a foundation of indigenous knowledge (Òtúlàjà et al., 2011). This is clear in the definition of IKS as "a conglomeration of knowledge systems encompassing science, technology, religion, language, philosophy, politics, and other socio-economic systems" (Ogunniyi, 2007a, p. 965). This definition depicts science as one of the indigenous knowledge forms. This indigenous science embodies the equivalents of western science categorised disciplines of "agriculture, fishing, forest resource management, climatology, as well as architecture, engineering, medicine, veterinary science, and pharmacology" (Oddora Hoppers, 2002). As such, indigenous medicine, the component in which the plant healing focus of my study resides, is a form of indigenous science or knowledge. Ogawa (1995) paradigmatically defines indigenous science as "a culture-dependent collective rationale of perceiving of reality".

Thirdly, the grounding of indigenous knowledge in a cultural matrix means it is attached to a cultural group. As discussed before, this is because knowledge does not reside outside culture and that culture is not external to people. The interwoven tripartite construct of culture, worldviews and knowledge are all functions of a locality. Therefore, in addition to describing indigenous knowledge as enterprise knowledge (Mpofu, Otulaja, & Mushayikwa, 2014), it is also characterised as locale or place-based (Aikenhead & Ogawa, 2007; Shizha, 2006). In other words, it is context specific (see section 2.2).

Castellano (2000) places Aboriginal (indigenous) knowledge into three main categories which I found to be applicable to other indigenous communities, including Zimbabwe. In the first instance, Castellano (2000) describes indigenous knowledge as traditional. From this perspective, indigenous knowledge implies knowledge traced back to the past, it is held by Elders and practitioners and is passed on inter-generationally. This perspective aligns with enterprise knowledge. The inter-generational transmission adds the pedagogical element to the E3P dimensions of knowledge that can also be examined to inform integrative classroom science practices. Next, Castellano (2000) defines indigenous knowledge as empirical knowledge based on careful observations of the environment (nature, culture and society). This implies the way of knowing or methodological approaches employed in the generation of knowledge. It supports the process knowledge dimension of the E3P model. Thirdly, Castellano (2000) talks of "revealed knowledge". This is knowledge revealed through intuitions, dreams and visions. Revealed knowledge is situated in spirituality (Dei, 2011). The findings of Mpofu, Mushayikwa et al. (2014a) that spirituality is central to African worldviews is consistent with the views of many indigenous scholars such as Dei (2011) and Ngara (2007). However, in this study, the indigenous knowledge as paradigmatic knowledge

goes beyond the spiritual ontology and epistemologies to include values, language and relationships.

Warren and Rajasekaran (1993) define indigenous knowledge as "local knowledge unique to a given culture or society and is acquired through the accumulation of experiences, informal experiments, and intimate understanding of the local environment". This definition underscores the cultural grounding of indigenous knowledge, as do the other definitions given above. Furthermore, it emphasises how this knowledge is acquired, that is, the knowing which is methodological and/or pedagogical. It provides three indigenous ways of knowing: (1) experience; (2) informal experiments; and (3) learning from the local environment. Experience based learning is real life situated and place-based. The environment in which the learning is situated changes in response to micro and macro level societal context specific factors. As such, knowledge and practices that are developed by human enterprises through intimate interactions with their environment often are pragmatically adaptive to shifts and changes in the environment (Berkes et al., 2000). This reinforces the dynamic dimension of indigenous knowledge. But, as discussed above, indigenous knowledge is also resilient. That indigenous knowledge is dynamic as well as resilient presents an oxymoronic conundrum side of it that makes the integration of indigenous knowledge into classroom science very difficult.

The description of the experimental mode of gaining knowledge as informal connotes a comparison to an alternative mode that is regarded as formal. Given that western science has been institutionalised, it makes sense to understand it as the formal knowledge being referred to here. In other words, informal experiments of indigenous knowledge are outside western science formal experiments. Such a comparison is problematic to the integration of indigenous knowledge into classroom science, as it seems to suggest that western ways of knowing are more authentic than indigenous ways of knowing. Despite this informal description hitch, the association of indigenous ways of knowing with experimentation requires a degree of empirical investigation. This is a shared feature with the western science way of knowing although its description as informal reinforces the higher status that has been accorded to western science relative to indigenous knowledge. However, experimental approaches may differ because they are rooted in distinct worldviews. This empirical approach to developing indigenous knowledge has been reinforced by Warren and Rajasekaran's (1993) third frame of how indigenous people develop their knowledge through observation or the study of nature in their local environment. Reinforcing this observation, Barnhardt and Kawagley (2005, p. 11) say that indigenous people

> have studied and know a great deal about the flora and fauna … made detailed observations of animal behaviour … predict weather based upon observations of subtle signs that presage what subsequent conditions are likely to be.

Indigenous knowledge can therefore be simply understood as "a complete body of knowledge, know-how and practices maintained and developed by people through interaction with the natural environment" (Nakashima, 2000). Its approaches, such as pedagogical strategies, educational systems, learning styles and research are quite different from those which are rooted in western science (Bishop, 2011).

In the following paragraph, I synthesise these perspectives to identify as precisely as possible the ways in which indigenous knowledge is to be understood in the context of this study. Seven interconnected and mutually informing dimensions of indigenous knowledge are identified:

(1) indigenous knowledge is generated within the natural contexts through observations, experiments and experiences;
(2) both the knowledge generated in the past and being currently generated is embedded in real life (not separated from practical life) because it is seen as a means for living and survival, rather than knowledge for its own sake;
(3) indigenous knowledge is local or place defined, therefore cannot be separated from the culture of the people inhabiting the place;
(4) indigenous knowledge is holistic. This implies that it embodies a web of relationships that draw from its inseparable components of the whole (see Battiste, 2002). In other words, a specific form of indigenous knowledge needs to show the POEMAR characteristics from which it is located;
(5) this knowledge is human archived and orally transmitted, as Battiste (2002, p. 11) explains: "Within an indigenous community, people vary greatly in what they know. There are differences between ordinary people and experts such as experienced knowledge keepers, healers, hunters and ceremonialists";
(6) knowledge development and consumptions are spirituality centred (Dei, 2002). This is because the indigenous knowledge is culture located;
(7) this knowledge is grounded in indigenous worldviews (indigenous worldviews are characterised in detail in section 2.3.4).

Hewson (2012, p. 6) refers to indigenous healing as a "type of indigenous science". She further paradigmatically refers to this form of indigenous knowledge as "a means by which

people explain and predict their world, especially as it affects their health and wellbeing". Similar to the term "indigenous knowledge", this healing knowledge carries many labels and definitions in addition to conceptualisation problems related to the issue of integrating indigenous knowledge into classroom science. Some of these labels, including primitive, bush, peasant or folk, traditional, and rural presage, connote the devaluated status of this type of medicine in relation to western medicine. This is not surprising given that all indigenous knowledge has been and is viewed as having lower status in comparison to the status accorded to western science (Hewson & Ogunniyi, 2010; Shizha, 2010). However, other labels, like "indigenous" and "African medicine/healing" have been, of late, adopted and portray a more amenable attitude to this body of healing knowledge. For the purposes of identifying this knowledge body with the bigger systems of culture and the worldviews in which it is located, I adopt the expression "indigenous knowledge of plant healing", IKoPH.

IKoPH (traditional medicine), as a form of indigenous knowledge, is "intertwined with cultural and religious beliefs, and is holistic in nature" (Truter, 2007, p. 57). It is inclusive of

> diverse health practices, approaches, knowledge and beliefs incorporating plant, animal and/or mineral based medicines, spiritual therapies, manual techniques and exercises applied singularly or in combination to maintain well-being, as well as to treat, diagnose or prevent illness (World Health Organisation -WHO, 2002).

Together, these two definitions illustrate that indigenous healing involves medicine from plants, animals, minerals and spiritualism. Almost every African community, particularly the rural communities, have an accessible healing system under the auspices of healers (Hewson et al., 2009). These healers, like the knowledge they hold, are referred to by different terms that include: medicine men/women, traditional medical practitioners (Hewson et al., 2009), specialists, witchdoctors or sorcerers (Mbiti, 1985) and traditional doctors. The attitudes towards these knowledge holders are reflected in the label used to identify them, like the knowledge they hold. For example, if the healers are referred to as specialists and medical practitioners, they command respect in recognition of their expert knowledge and the services they offer to people. The other terms, witchdoctors or sorcerers, are pejorative and devalue them. In this study, I prefer the term "healers" in view of the holistic nature of managing health it portrays and indicates how the healers perceive illness as "a spiritual, societal, psychological, physical, and/or physiological disequilibrium that must be corrected for health to be regained" (Hewson et al., 2009, p. 7).

Truter (2007) asserts that healers perform different roles which are not exclusive but overlap

each other. They basically provide health services that reflect the indigenous knowledge they hold concerning health and illness. They also manage birth and death in their communities (Hewson, 2012; Hewson et al., 2009). Their modes of plant healing vary (Dhewa, 2008). These healers basically constitute two main types that relate to their expertise. The expertise of some healers is spiritually based while that of others can be described as physical (Hewson, 2012; Shizha & Charema, 2011).

Assisted healers' practices are often culturally protected (patented) through secrets and sacredness such as taboos (Dhewa, 2008). The ultimate owners of the assisted healers' knowledge are therefore the spirits that is why they guard against disclosure of their knowledge. The nature of assisted healership was described in detail in section 1.5 of Chapter One (p. 14).

The physical healer category is one, which is often described in literature as the herbalist and vendor group. Such healers acquire their practice through various ways exclusive of spiritual trances but inclusive of intuitive dreams/visions, assistantship experiences and sharing of knowledge (Dhewa, 2008; Kazembe, 2007; Shizha, & Charema, 2011; Thornton, 2009). Unlike the assisted healers, these healers always operate alone and in ordinary states of being. To reflect this individual characteristic that differentiates these healers from assisted healers, I label these practitioners "individual healers". The individual healers focus on the product or knowledge of the physical healing plants, the ailments they treat and how they are used. They generally defy the cultural frame of practice and consider the knowledge they hold as their own (see Dhewa, 2008). It is difficult to authenticate the dream and intuitive claims of such healers.

Healer grouping shows that their practices, diversities and complexities further complicate the task of integrating IKoPH into classroom science because the question is which kind of knowledge is appropriate for incorporation in the classroom, the assisted healers or the individual healers? One may argue that the knowledge drawn from assisted healers is more holistic and culturally representative as their practice is deeply rooted in the spiritual ontologies and epistemologies that are central to indigenous worldviews. Notably, access to this knowledge is more problematic. Such issues show the importance of accessing authentic knowledge that represents its cultural identity in the science classrooms because the understanding of learners at classroom level might be limited in both its breath and depth. This then agrees with the suggestion that experts of this knowledge need to be involved in both its teaching and research (see Aikenhead, 2001, 2002; Barnhardt & Kawagley, 2005).

Literature shows that the use of healing plants among African communities predates colonialism and that the majority of indigenous Africans still seek the services of healers and/or use IKoPH to manage their health problems. It is also a historical fact that, in Zimbabwe, this African "primitive" body of knowledge and system of health care, as the colonialists called it, has survived several centuries of colonial governments' and missionaries' concerted efforts to eradicate it (Chavunduka, 2001; Kazembe, 2007). How the IKoPH came to be subjugated by western medicine based systems in different parts of the world, and in Zimbabwe in particular, is detailed in section 3.4 starting from page 91. As a result of colonialism, many indigenous Zimbabweans have become dual or tripartite health plant knowledge holders and/or practitioners and/or consumers. This is because, as reported in Mpofu, Mushayikwa et al. (2014a), they draw this plant healing knowledge from three worldviews which are: Christianity, western medicine and indigenous healing. Furthermore, it was established that the majority of the participants of this study readily and eagerly revealed their Christianity and their use of both western medicine and of healing with plants but were more reserved and secretive in conversations related to indigenous healing. Such findings reinforce possible challenges to gaining access to this form of knowledge from its holders for classroom practice purposes.

Despite the colonial marginalisation of indigenous healing, it has been observed that today Zimbabweans form part of the approximately 80% of the population of developing countries that use traditional medicines (Bodeker, & Kronenberg, 2002). This strongly indicates that this knowledge exists in communities. There are various reasons advanced in literature why people use indigenous medicine, particularly in relation to western medicine. These include: affordability, accessibility, availability, efficacy and cultural compatibility (Kazembe, 2010). Some studies (Galabuzi, Agea, Fungo, & Kamoga, 2010) have, however, revealed that reasons of efficacy and beliefs of compatibility far surpass those of affordability and accessibility. This implies that most people seek indigenous healing services because they think that the traditional system of healing is valuable for them. In addition, it has been noted that the rise of demand for healing plants correlates with the emergence of pandemics that challenge western medicine, such as the Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS) thus HIV/AIDS (Dhewa, 2008). It is shown that indigenous children in Zimbabwe and other African communities are living with the experiences of fighting such pandemics with African healing within their families and in communities such as Tendera.

In Zimbabwe, this knowledge, as important as it is to the people's lives, is excluded from the

curriculum. This observation is not peculiar to Zimbabwe because Hewson et al. (2009) have made the same observation about South Africa. The recent Constitution of Zimbabwe's (2013) provision for the inclusion of traditional healing in the school curricula is reflective of the government of Zimbabwe's realisation of its value to the people of this country. Its inclusion will be an important way to make science relevant to the daily lives of learners and to improve the cultural relevance of classroom science to the learners and the communities that are raising them. One major challenge of integrating this knowledge body into classroom science is, as also observed by Hewson (2012), that educators, particularly those with a western science training background, have limited understanding of IKoPH. My extensive literature review has also revealed it is an under-researched area in science education. For this reason, I am confident that my documentation of African knowledge of plant healing of Tendera and the illustration of how it can be taught in science classrooms is a relevant contribution to science education in Zimbabwe and beyond.

The western medicine discipline has long recognised the medicinal efficacy of some plants used by healers. In fact, some western owned pharmaceutical companies have even sought collaborations with healers in developing plant-based drugs. For example, between 1994 and 1998, the South San Francisco Shaman Pharmaceuticals collaborated with healers in Guinea, a West African nation, and identified 145 plant species as useful for the treatment of type 2 diabetes mellitus (Carlson et al., 2001). The contributions of these healers were highly recognised and acknowledged unlike the case of the San people of Southern Africa (Tonye, 2005). This case explains how the San people informed a South African botanist on the suppression of hunger and thirst effects of the *Hoodia* plants. The botanist informed the Council for Scientific and Industrial Research in South Africa who carried out medical research on the plants. The results of this research on the bioactivities of the Hoodia plant paved the way for a United States company, Pfizer Pharmaceuticals, to develop the drug into an obesity control medicine (Chennells, 2012). The research body surreptitiously patented it and, in turn, licensed it to Pfizer without acknowledging the San knowledge owners. The Hoodia case illustrates the colonial exploitation of indigenous resources, including knowledge that results in indigenous people treating any research into their knowledge as suspect and subject to colonial exploitation. This makes access to such knowledge repositories very difficult that may affect teaching in the classrooms. At the same time its protection, preservation and promotion as desired by the advocates of anti-colonial theory (see section 2.2, p.26) becomes a necessity. Yet, balancing acts of promotion with those of protection is a big challenge to the integrators, researchers and classroom practitioners.

Alternatively, classroom practitioners can access plant healing knowledge from literature for teaching purposes. Shizha (2010) contends that healing plants in Africa are well documented. This is because plants with medicinal value have been an area of interest of western science fields that include biomedicine, pharmacy, ecology, botany, heath science, and ethno-medicine. Such publications tap into the knowledge of plants with medicinal value from indigenous people and communities across the world. For example, in Zimbabwe, Gundidza, Chinyanganya, Chagonda, De Pooter and Mavi (1993) report on many studies that go back more than two decades conducted by the School of Pharmacy and the Department of Chemistry at the University of Zimbabwe. One of these studies by Gelfand, Mavi, Drummond, & Ndemera (1985) revealed that about ten per cent of more than five thousand plant species growing in Zimbabwe have medicinal properties and are used as traditional medicines. Notably, such studies have tended to focus on the medicinal activity of the plants from the phytochemical analysis approach. This means that those plants used effectively by traditional healers that did not show medicinal properties were judged medicinally valueless. This makes such literature representative of the western concept of medicine and, therefore, limited in its representation of African cultural healing systems. This is because, within the African healing systems, some plants are believed to be spirited into being medicinal for particular ailments at a given time (Mafimisebi, & Oguntade, 2010).

My extensive literature review has shown that the various publications on indigenous plants across different disciplines of research have no direct application to education. In fact, they mostly focus on the product knowledge at the expense of the paradigm, processes and enterprise forms of plant healing knowledge. In addition, most of them reflect a western template of examining the medicinal value of the plants. This means that such literature lacks the holistic view of this African knowledge of plant healing system. As such, drawing content from it for teaching purposes does injustice to this knowledge system and indigenous knowledge in general. It also fails to address the worldviews that underlie the problems of learning science. It assumes IKoPH or indigenous knowledge has no methodological process of developing healing knowledge. Moreover, such documentation, which is divorced from science education, does not reflect formats that are commensurate with classroom practices from which teachers can draw examples. I, therefore, strongly believe that filling these gaps as illustrated in the findings of Chapters Six to Eight of this study is a valuable contribution to science education and practice.

2.4.2 Classroom science as an image of western science

Aikenhead and Ogawa (2007) argue that classroom science is not synonymous with western science. Though I share the same sentiments, I also realise, from my professional background and the literature I have reviewed, that western science is being offered in Zimbabwean classrooms. In fact, many non-western nations have western science in their science curricula (Guo, 2007).

Science as a western-oriented body of knowledge is described in three fundamental ways (Mpofu, Mushayikwa, et al., 2014b; Mpofu, Otulaja, & Mushayikwa, 2014). Firstly, it depicts a domain of knowledge taught and learnt within the context of schooling. As school knowledge, classroom science, therefore, focuses on teaching and learning, that is, pedagogy. I construe pedagogy in terms of "the thinking and theorising about how learners learn" (Kidd & Czerniawski, 2010, p. 6) that influences classroom practices in terms of teaching strategies or methods, tools and techniques. Pedagogy can therefore be regarded as both a theoretical and an instructional tool. Because the learning of science is construed from worldview perspective, some science education scholars, such as Aikenhead (2006) and Cobern (2000), argue that pedagogical approaches adopted in western classroom science emphasise a western scientific worldview of understanding nature at the expense of the learners' indigenous worldviews. Aikenhead (2001, 2002) regards western science approaches as a form of cognitive assimilation or cognitive imperialism which includes argumentation, scientific inquiry and problem-solving. However, Pember (2008) believes that not all the western grounded approaches to teaching science are assimilative. Rather, that the current emphasis on learning in community, authentic learning and learning through inquiry, structure learning in a similar way to that of indigenous learning. The difference lies in the emphasis of these two approaches. Emphasis on science representations (Le Grange, 2007), that is western scientific product knowledge, calls for conceptual change and understanding of western science. In this regard, such pedagogies remain assimilative and therefore problematic to the indigenous knowledge.

In the second instance, the expression of western classroom science characterises classroom science as a construct of western science. This includes content, pedagogy and purpose (Mpofu, Mushayikwa, et al., 2014b). However, the pedagogical focus of classroom science differs from the focus of western science (Grandy, & Duschl, 2008) because learning is embedded in the processes of knowledge production. In the classroom setting, learning is a direct experience of the teaching of knowledge drawn from western science. The CACS

model suggests that the content of classroom science can be built from the four knowledge dimensions: paradigmatic process, product and enterprise knowledge. This led me to the conclusion that classroom science content is a combination of products, processes and the nature of science as well as the scientific enterprise. This content framework becomes an analytical tool for understanding the extent to which classroom science at Junior Certificate level in Zimbabwe is representative of the western science.

Thirdly, the descriptor "western" in the expression "western classroom science" also depicts the cultural orientation of this classroom science (see section 2.3.2 for the examination of science and classroom science). It draws from the cultural worldviews of scholars such as Cobern (1991) and those of cross-cultural analysis such as Battiste and Henderson (2000), Little Bear (2000), and Snively and Corsiglia (2001). In this regard, western science is perceived as a western sub-culture (Aikenhead, 1996) and indigenous knowledge as science alternative to western science (Ogawa, 1995). In turn, classroom science becomes a sub culture of western science culture. This cultural analysis of science gives a clear picture of the three worlds of science that are fundamental to the learning of science which are western science, classroom science and home (the indigenous world). The worldview theory of learning thus informs us that the learning of science involves the cognitive movement across these different worlds. When children are not pedagogically assisted in negotiating the boundaries of these worlds, they encounter problems of understanding. As such, integration of indigenous knowledge and western science at classroom level needs to aim at bridging these knowledge worldviews in a way that makes these three knowledge bodies culturally acceptable. This needs to be done from an understanding that school science has its own culture that differentiates it from the broad western science culture and home culture (see Meyer & Crawford, 2011). In terms of integration, the classroom science becomes the bridging space of the indigenous and western cultures.

Earlier discussions show that the nature of western science, like that of indigenous knowledge, is shaped by its culture and worldviews. An understanding of the western-orientation nature of classroom science warrants an examination of the nature of western science. It is generally agreed that western science has a distinct scientific culture that uniquely identifies it (Godin, & Gingras, 2000). This is rooted in the efforts to make it distinct from other knowledge bodies (see Aikenhead, & Ogawa, 2007). However, the concept of scientific culture is varied (Godin & Gingras, 2000) and complex which adds to the conceptual challenges of integrating indigenous knowledge and western science at classroom level.

There is much literature on the nature of western science that shows that this discourse is controversial. My focus here is not on these arguments, but instead, to identify the main features that give science its western scientific cultural identity. In view of both the paradigmatic and E3P theory of knowledge, it makes sense to think of the nature of science as its philosophical dimension that constitutes a set of presumptions and beliefs about the world. These worldviews are considerably different from those of indigenous knowledge. As such, I turn to discussing these western scientific worldviews in comparison with those of indigenous knowledge in the ensuing section.

2.4.3 A paradigmatic comparison

Battiste (2002, p. 202) asserts that "creating a balance between two worldviews is the great challenge facing modern educators" who wish to integrate indigenous knowledge and western science at classroom science level. This demands a paradigmatic comparative examination of these two knowledge bodies. Literature on western science and indigenous knowledge paradigms falls into two main categories, the dichotomous and the complementary. In the dichotomous perspective, scholars view western science and indigenous knowledge as incommensurable (Verran, 2005), irreconcilable (Russell, 2005), incommensurate (Battiste, 2002). This is because these two forms of knowledge are grounded in two different cultural ways of knowing that "approach the physical world from opposite ends" (Levi-Strauss, 1962, p. 269). Some scholars, like Shizha (2010), Barnhardt and Kawagley (2005), see in the synthesis of indigenous knowledge and western science a way of advancing their integration. This is a complementary approach that recognises the differences and fundamental similarities between these two knowledge bodies. In addition, it takes into account that the similarities of these two knowledge bodies exist in two different cultural contexts.

My paradigmatic comparison of these two bodies of knowledge is based on four categories drawn from the E3P knowledge model ((Mpofu, Otulaja, & Mushayikwa, 2014) and the synthesis model (Barnhardt & Kawagley, 2005). The synthesis model is represented in Figure 2-3 below.

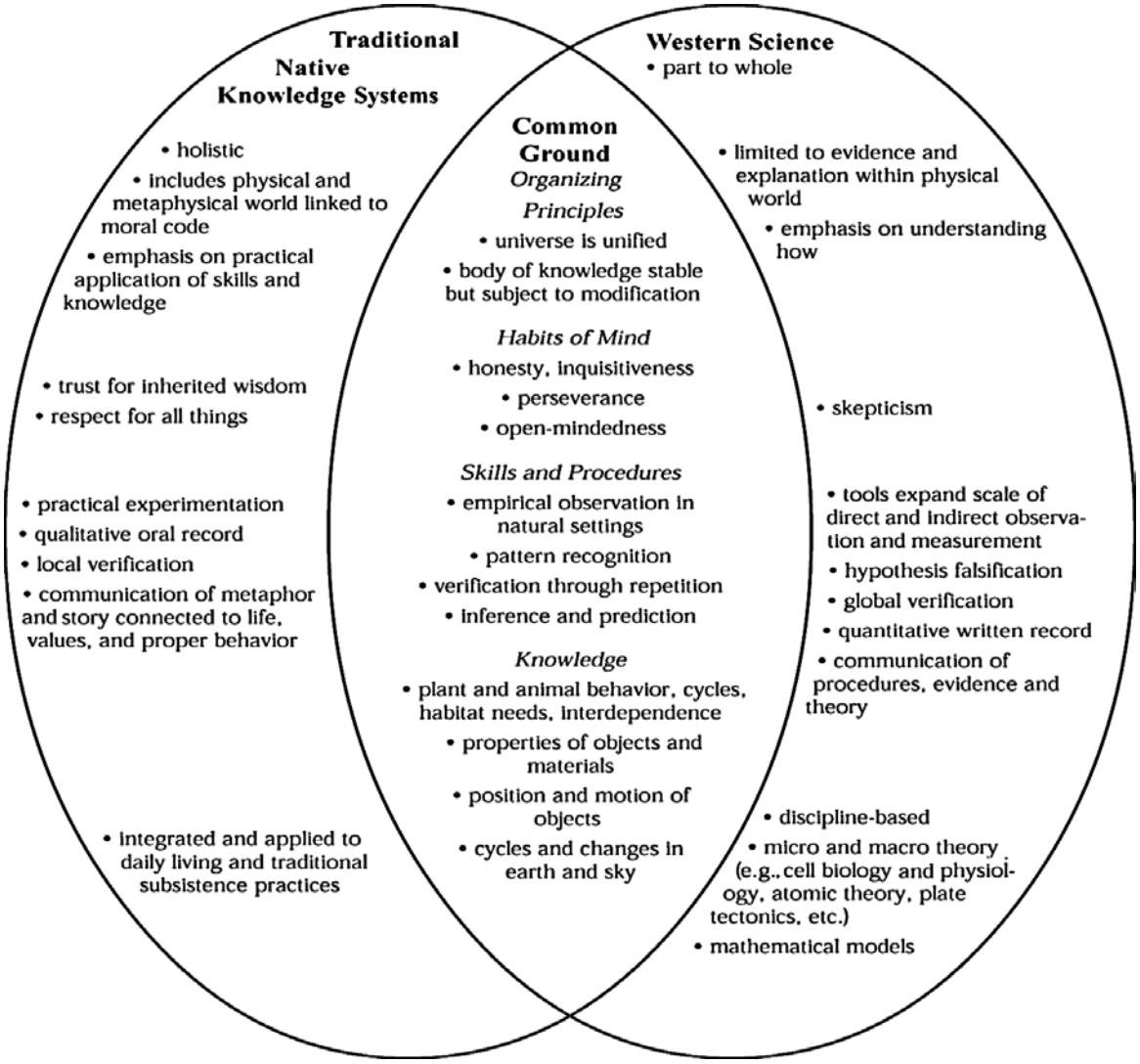


Figure 2-3: The knowledge synthesis model (Barhardt & Kawagley, 2005, p. 16)

Figure 2-3 above shows worldviews unique to each knowledge body and those they share in three spaces. These spaces are identified in bold text as traditional native knowledge systems (indigenous knowledge), western science and common ground. Under the indigenous knowledge space, there are worldview statements distinctive to this body of knowledge. Similarly, the worldview statements unique to western science are entered in the space under it. The overlapping space, described as Common Ground, intersects the similarities between these two knowledge bodies. The worldviews under each of these three categories of indigenous, common, and western science are further categorised into four themes: organising principles, habits of mind, skills and procedures, and knowledge. These are the themes that I interpreted as aligning with the four dimensions of the E3P knowledge model. The organising principles relate to the paradigm dimension; the habits of the mind relate to the enterprise values; that of skills and procedures relate to the process dimension; and that of knowledge relates to the product dimensions. This alignment leads me to the discussion of

the differences and similarities under four themes: worldview principles, enterprise values, methodological processes, and representations. These categories give a synopsis of much of the literature. They are not exclusive but rather are interconnected and overlap considerably. In each of these themes, I discuss the difference between indigenous knowledge and western science. In doing this, I weave Barnhardt and Kawagley's (2005) comparison of these worldviews with perspectives of other scholars.

The worldview principles of indigenous knowledge and western science differ from each other in several ways. Within the indigenous worldviews, nature is always viewed as possessing unfathomable mysteries (Aikenhead & Ogawa, 2007). This presumption contrasts with the eradication of mystery in nature by western science. In other words, western science presumes that nature is completely understandable to the rational human mind. Indigenous people view living in harmony with the mysteries of nature as a survival tool. One central and respected aspect of mystery in an indigenous worldview is spirituality (Simpson, 2000). Indigenous worldviews are holistic. Battiste and Henderson (2000, p. 43) describe "holistic" as "the non-existence of discipline categories such as science, art, religion, philosophy, or aesthetics that are found in western scientific thoughts". It views nature as a complete whole comprising connected components as opposed to the view of western science which defines it as fragmented (Barnhardt & Kawagley, 2005). Within indigenous worldviews, nature includes the biological (animals and plants, including human beings), the physical (mountains, water bodies, rocks) and the metaphysical (spirit). In contrast, western science denies the existence of spirituality. Despite these differences, Figure 2-3 shows the principles of the universe as a unified and durable but changeable body of knowledge which is shared by these two knowledge bodies.

This theme reinforces what most scholars agree which is that indigenous knowledge and western science are both culture-laden. While indigenous people trust their inherited wisdom, western scientists are generally sceptical. Within the indigenous worldviews, each element of the universe is viewed as spirited and alive and, therefore, is accorded equal respect (Simpson, 2000). The land is respected as both a sacred place and provider of life that is honoured on a daily basis. Reciprocity connects the human and the natural worlds and natural resources are viewed as gifts. These values show the indigenous worldview of human actions that are subjectively, ethically and intimately related to nature (Aikenhead, & Ogawa, 2007). In comparison, western science presumes knowledge of matter is free from human socio-cultural values. As shown in the common ground space, western science and indigenous knowledge share the values of honesty, inquisitiveness, perseverance and open-mindedness.

In studying nature, western scientists exercise dominion and power over nature (Aikenhead, & Ogawa, 2007). In so doing, they make use of senses and tools to verify formulated hypotheses (Figure 2-3) which leads to experimental methodologies that control variables. These methodological procedures are connected to the dualism of nature, mechanistic explanations and reductive tendencies of western science. Western science relies on quantitative measurements, written records and communications (Barnhardt, & Kawagley, 2005). Indigenous inquiries exist as much as western scientific inquiries do, however, these inquires differ considerably from western scientific inquiries. Indigenous inquiries or observations are connected to the indigenous worldviews of monism and holism. Monism is explained by indigenous scholars, such as Battiste and Henderson (2000) and Cajete (2000), as an ontological view held by indigenous people of everything in the universe inclusive of animals, plants, humans, rocks, celestial bodies, natural forces, among others, as being spirited, therefore alive. Battiste and Henderson also point to the epistemological view of holism as relating to the non-compartmentalised nature of indigenous knowledge. Thus, a knowledge system whose elements of science, art, religion, philosophy, or aesthetics are interconnected and interrelated into an inseparable whole. As such, indigenous people through their long observations of patterns of nature have become specialists in understanding the interconnectedness and holism of their place in the universe (Barnhardt, & Kawagley, 2005, p. 12).

Indigenous people study nature over long periods through close and respectful co-existence with other elements of nature.

> When observed very carefully, animals reveal many secrets of living in balance and harmony … have certain powers that can be used for personal, family and community health and survival (Michell, 2005, p. 40).

Indigenous empirical observations use data that are figuratively (metaphoric) and literally (oral) removed from western science (Aikenhead, & Ogawa, 2007). Though observations in natural settings, pattern recognition, repetitive verifications, predictions and inference are common to both forms of inquiries, there are many methodological variations between them. These are fundamentally traceable to their differences in organisation principles.

The representation theme relates to the nature of knowledge and reality presumptions. The difference in this knowledge is that, within the indigenous knowledge realm, knowledge is embedded in real life. Truth is multiple and is shaped by life experience (Simpson, 2000). For example, the plant healing knowledge is generated or modified, shared and consumed in day-

to-day life. What the plant heals is connected to the individual's cultural background and experiences. In contrast, knowledge in western science is discipline based. It is firstly developed, then validated through a series of tests before it is utilised. The plants are subjected to phytochemical analysis and hypothesised medicinal properties are tested before it is released into the market for public consumption. The medicinal activities established are defined as an objective reality and are therefore universal. Thus knowledge constitutes an objective reality of generalised descriptions or scientific laws that are causal, logical, rational, impersonal and universal (Ogunniyi, 2004). This compares to holistic, empirical, intuitive, spiritual, place-based qualitative descriptions and explanations of nature (Aikenhead & Ogawa, 2007).

The translation of these theoretical propositions in science education has remained a challenge. However, a common translation in science education has drawn from the theory of third space advanced by Bhabha (1995) who suggests approaching cultures for an interdependence of the colonised and coloniser so that these cultures can interact in ways that bring about hybrid cultures or identities. He advances the concept of "third space" as the intersection where cultures interact into hybrid identities. He frames the third space as the "space between" cultures that brings about cultural mixes and suggests that understanding between cultures can be based on negotiations within this space.

The application of this third space theory in relation to the synthesis model above means that the indigenous culture provides meaning and identity to indigenous people in the first instance. This home/indigenous culture therefore is their first space. To indigenous people in colonised nations, western science comes second and as an alternative to their indigenous knowledge. It provides a second cultural space for western scientific cultures. Indigenous children basically encounter this second cultural space within school settings. The intersection between the home culture and the western science represented in classroom science becomes the third space. The goal of learning in the third space becomes to facilitate the understanding of the world from the indigenous knowledge and western science perspectives (Aikenhead, 2002; Stephens, 2000). The Two-Eyed Seeing model of Hatcher, Bartlett, Marshall and Marshall (2009) explains this understanding of the world from both indigenous knowledge and western science worldviews. Within this model, both kinds of knowledge have strengths for understanding phenomena. So, the teaching of phenomena from both perspectives promotes the side-by-side functioning and visibility of these two knowledge forms. This complementary approach to integration seems to encourage equality, mutual respect, support and cooperation between these two knowledge forms, thus uplifting

the status of colonised knowledge to that of the coloniser.

Le Grange (2007, p. 584) links the worldview incompatibility approach to the representation view of science. Classroom science materials, such as textbooks, described as western oriented contain western scientific representations. These representations do not accommodate indigenous knowledge because they focus on differences. They emphasise approaching these knowledge bodies from an either/or and superiority/inferiority positions. This being the case, integration of indigenous knowledge into classroom science entails the selection of aspects of this knowledge body that fit within the western science boundaries. Thus, this dichotomous frame can be regarded as an educational tool to enhance the western science domination over indigenous knowledge. However, to those who abide by the notion of multiple sciences, these paradigmatic differences can be considered as the cultural differences and complexities that may impinge on the integration of indigenous knowledge and western science at classroom level. Hence, they act as the basis of strategic planning to bridge these differences and allow for a harmonious co-existence of the two knowledge bodies in the classrooms. This desired relationship implies a complementary perspective of these two bodies of knowledge (Barnhardt, & Kawagley, 2005; see Metallic, & Seiler, 2009; Nakata, 2007). Nakata (2007) urges us to fully conceptualise the consequences of operating from the simplistic paradigmatic comparisons. He argues that "it is not possible to bring in indigenous knowledge and plonk it in the curriculum smoothly without difficulty as if it is another data set for western knowledge to discipline and test" (Nakata, 2007, p. 9).

2.5 Indigenous knowledge and Western science in the classroom

Science education literature on integrating indigenous knowledge and western science at classroom level is abundant. The discourses around this issue are also proliferating controversy. Five main themes emerged from these variant angles and controversies, which forms the organisation of this section. These are the integration concept, perspectives of integration, a double "visioning" rationale, indigenous knowledge content for integration and pedagogically "fitting" frames. To conclude this section, I examine literature on project cases that have celebrated successes of integrating indigenous knowledge and western science in education.

2.5.1 The concept of integration

In the literature, the term integration, in respect of indigenous knowledge and western science at classroom level, has been left more to the readers' interpretations than specifically defined.

Mack et al. (2012, p. 53) describe the term in relation to what it does to the students' learning of science instead of what it is. They say:

> By integrating multiple ways of knowing into science classrooms, students will learn the value of traditional ways of knowing and Native language, learn to utilize a conceptual ecological perspective, and acknowledge that learning and understanding are part of a complex system that includes student experience, culture, and context, as well as mainstream materials that are taught in the classroom.

I understood the term in two interrelated tiers from such literature. In the first instance, it can be argued that the statement "by integrating multiple ways of knowing into science classrooms" reflects the current western oriented state of classroom science practices in many nations. Otherwise, if classroom science was inclusive of indigenous knowledge and western science, there would be no such discourse. Such classroom practices have been castigated as culturally irrelevant to indigenous children and nations (Makhurane, 2000). Given this western state of classroom science, the term "integration" in the first tier implies moving the indigenous knowledge from the community into the classroom space. The focus here is on learning place. Since classroom practices are guided by the curriculum documents, it follows that, for indigenous knowledge to be visible in the classroom practices, it has to be moved into the syllabus.

Secondly, Mack et al.'s (2012, p. 53) view of the integration of indigenous knowledge into the science classroom has three learning outcomes. Thus, the student will (1) value indigenous knowing and language; (2) utilise its environmental perspectives; and (3) understand learning as a complex system that involves cultural interactions between western science and indigenous knowledge. The focus of these three outcomes is on conception and therefore cognition. According to Phelan et al. (1991), cognition involves the knowledge, attitudes, beliefs, values, expectations, particular skills, and norms of a group. These are all aspects of culture from which we can simply describe cognition as involving a cultural understanding. Therefore, cognitively, the learning of science within the classroom context involves the interaction between the cultural and western scientific worldviews. In this regard, the integration of western science and indigenous knowledge focuses on the learners' cognition. It can be therefore described as the learning of phenomenon from two frames of knowing without experiencing any cognitive dissonance.

Literature extensively acknowledges that indigenous people have their own knowledge and styles of learning and teaching which are neglected by western oriented classroom practices

(Snively & Corsiglia, 2001). Such western classroom science practices are at odds with the learners' cultural backgrounds (Aikenhead, 1996). This has been found to be problematic for indigenous learners because their worldviews clash with those of western science (Snively & Corsiglia, 2001). Moving some aspects of indigenous knowledge from the community into the classroom science practices is therefore viewed as creating a space for cultural mixing. It is envisioned as promising to alleviate the learning problems associated with worldview clashes (see Aikenhead, & Jegede, 1999; Ogunniyi, 1988; Thaman, 2009). Such problems have alienated learners from science, forcing them to opt out of school science (Malcolm, 2007).

Aikenhead's (1996) introduction of the concept of cultural border crossing in science education helps us to imagine and understand what takes place in the learners' cognitive spaces as they learn science. It also helps us to explain two main research observations about the children's learning of science. Studies have shown that western oriented classroom science is generally alien to all learners irrespective of their cultural backgrounds, western and indigenous (Sutherland, & Dennick, 2002). As such, many learners experience science learning problems (Aikenhead, & Jegede, 1999; Jegede, & Aikenhead, 1999). However, indigenous learners face more problems relative to their counterparts with western cultural backgrounds. To explain these observations, this cultural border-crossing model visualises forms of knowledge, science and classroom science as rooted in and representative of different cultures. Each of these knowledges is viewed as existing in its own cultural world, that is, indigenous knowledge in the indigenous (home) world and western science in western scientific cultures. Western classroom science largely images western scientific cultures (see section 2.4.2 above). In the children's minds, these three knowledge forms can occupy a cultural space that is separated from others by cultural borders. So, learning of science becomes a cultural border crossing event (Aikenhead, 1996, 1997). In other words, within the cognitive space of the learner, learning science involves crossing the cultural borders between his or her home, and both western and classroom science.

In Mpofu et al. (2014a) we argue that learning of western science does not only involve the crossing of the home culture and classroom science culture borders, but rather many borders. The complexities of crossing these borders depend on the learners' cultural backgrounds, which, in turn, determine the numbers and types of borders to be crossed. An African learner, in his or her mind, crosses three main cultural borders when learning western science: (1) home-western culture; (2) western cultures-western scientific culture; and (3) western scientific culture-classroom science culture. The African learner's encounter with a western

cultural background involves (inter) border crossings from his or her home culture into the western scientific culture, then the classroom science culture. Logically, crossing inter borders is more difficult than crossing intra borders. This suggests why some learners find learning science difficult and yet others find it comprehensible (Mpofu, Mushayikwa et al., 2014a). These learning of science borders are "boundaries in flux" which complicate their crossing and therefore call for sensitivity (Carter, & Walker, 2010).

The integration of indigenous knowledge and western science at classroom level implies assisting learners to make a connection between classroom science and their culture. Literature reveals two basic approaches to linking classroom science and indigenous knowledge that I describe as single "visioning" and double "visioning". The single "visioned" cultural border crossing is a one-way crossing. It uses indigenous knowledge as background knowledge that is necessary to enhance the learners' understanding of western science being taught in the classroom. It promotes western scientific ways of knowing that eventually lead the learner to understand phenomenon from the western scientific perspective. The double "visioning" border crossing is similar to Lee et al.'s (2012, p. 1184) "double trans-cultural learning experience." Border crossing within this frame is two ways between home and western science culture. This resonates well with the Two-eyed-seeing principles of Hatcher el al. (2009) introduced in section 2.4.3 above.

Notably, integrating indigenous knowledge and western science in educational programmes is clouded with divisive debates (Lowan, 2012a). These necessitate examination in order to situate this study in these debates. This forms the subject of the next section.

2.5.2 Perspectives on integration

Riggs (2005, p. 311) asserts that "incorporating indigenous knowledge systems is an essential but often complex task". This is supported by mixed views about this issue revealed in the literature in addition to conceptual and paradigmatic challenges discussed in the foregoing sections. Such views can be fitted within the "total exclusion through cautious and partial total inclusion continuum" (Ogunniyi, 2011, p. 103). There are scholars who advocate for total exclusion of indigenous knowledge from classroom science while others advocate for total inclusion. There are also scholars who are for selective inclusion. Reviewing such literature helps to explain why the day-to-day practice of science education has largely remained western science oriented in many nations despite integration policies being in place (Ntuli, 2002; Oddora Hoppers, 2002). Zimbabwe is no exception (Dziva et al., 2011; Mpofu & Muropa, 2015; Shizha, 2007).

Views on the idea of integrating classroom science can be traced to the perspectives of what people count as science. Those who abide by the universal view of science tend to dismiss the integration of these two knowledge bodies as valueless. This is largely tied to the colonial mentality that renders indigenous knowledge as "primitive" which is why they exclude it from westernised science curricula (Ogunniyi, 2011). This continued exclusion of indigenous knowledge in classroom science perpetuates indigenous cultural and cognitive subjugation (Battiste & Henderson, 2000).

Cognitive imperialism in school science refers to initiating children with an indigenous cultural background into thinking like western scientists at the expense of their indigenous ways of thinking (Battiste, 1986). This western science basis of teaching is assimilative (Aikenhead, 2001), therefore colonising. It can be argued that these colonising approaches lag behind the documentation and development of indigenous knowledge and, in particular, in formal classroom sciences that are commensurate with classroom practices.

Tied to the colonial aftermath, some scholars find hegemony as having distanced and created tension between these two knowledge bodies to the extent that they cannot be taught within the same classroom space. Others are concerned that integrating indigenous knowledge into the curricula grounded in western systems of schooling, is most likely to further its subjugation or "water it down" (Battiste, 2008). In line with Battiste's thinking, Adams (2010) cautions against repeating the colonial ills. Carter and Walker (2010) also emphasise that integration of these two knowledge bodies needs to promote epistemological [paradigmatic] justices. Keane (2008) is rather concerned with the gross oversimplification of indigenous knowledge preservation inherent in its "bit that fits" inclusion into the current syllabus that demonstrates "our western science hubris" (p. 589). Furthermore, she believes that it is unsuccessful to use indigenous knowledge as examples within a western science paradigm.

The above views are pertinent to consider in our pursuance of integrative classroom science. This is because they give us insight into the consequences of documenting indigenous knowledge and placing it into the institutionalised education systems which are, in themselves, western infused and products of colonialism (Matsika, 2012; Shizha, 2012). Thus, teaching western science within the classroom context fundamentally frames it within western frames of education. Nakata (2007) advises on several implications of documenting indigenous knowledge and fitting it into the school curricula. Basically, this disembodies indigenous knowledge from its human archive and separates it from its social institutions that

uphold and reinforce its efficacy. Such decontextualising of indigenous knowledge from its local context means cleaving it from its life embedded practices and redistributing it and fitting it into western categories of classification, including science. Doing this suits the hierarchies, linearity, abstraction and objectification of western knowledge. Thus, this process is likely to include only indigenous knowledge that is likely to fit within the western science realm into science classrooms aspects. Such approaches potentially diminish, dilute or water down indigenous knowledge and therefore may result in under- or misrepresentation of indigenous knowledge in the curriculum and classrooms. According to Nakata, all this is the antithesis of indigenous knowledge traditions.

Battiste (2005) and Simpson (2004) do not dismiss the idea of integrating indigenous knowledge into classroom science. Instead, they suggest that this integration starts with its full development within its own perspectives and contexts. Aikenhead and Ogawa (2007) and Nakata (2007) support these pre-classroom practices that incorporate the full understanding of the nature of indigenous knowledge. Such a strategy is likely to address challenges threatening the integration of indigenous knowledge and western science at classroom level. These include: limited documentation that leaves teachers with no choice other than to access indigenous knowledge from its human repositories (Òtúlàjà et al., 2011); the teacher's limited understanding of its nature and insufficient pedagogically fit approaches (Hewson & Ogunniyi, 2010; Ogunniyi, 2007a); and teachers' negative dispositions towards this knowledge body and the notion of integrating it into science classrooms (Hewson et al., 2009; Ngara, 2007; Shizha, 2007). All these problems can be traced to the fact that indigenous knowledge has largely remained oral so that very little is known about it. However, Aikenhead (2001) has demonstrated that proper access to this knowledge from its human holders is both an educational and developmental tool. Aikenhead claims that his "Rekindling Traditions" project, in which he developed teaching materials from Aboriginal knowledge in relation to science, was a success (see section 2.5.6 below for further detail). For clarity and future reference in ensuing chapters, I define "documentation" as a material development process that transforms indigenous knowledge from an oral to a written form. Aikenhead (2001) also believes that proper access to its expert holders can develop positive attitudes towards indigenous knowledge in both learners and teachers. Documentation therefore becomes both a resource material and a learning tool and holds the promise to overcome the major integrative classroom science challenges.

Some scholars have moved this discourse from whether indigenous knowledge and western science could be integrated at classroom level to how this could be done. Their suggestions

are varied in the literature. To the majority of scholars, both western and indigenous (e.g. Barnhardt & Kawagley, 2005; Dei, 2000; Shizha, 2010), the complementary approach is a fitting approach for achieving this integration (see section 2.4.3 above). Shizha's (2006, p. 28) hybridisation integration is premised on his argument that "in many societies, including Zimbabwe, a hybrid of knowledge has emanated from cross-cultural movements within and without national borders". This makes the integration of hybridisation resonate well with the convergent strategy of Mpofu, Otulaja and Mushayikwa (2014). These integration approaches depart from the synergistic approach proposed by Barnhardt & Kawagley (2007) which they describe as a complete and holistic system that intersects similarities and retains differences of the two systems (see Figure 2-3,p. 57). The synergistic approach aligns with the parallel integration of the CACS model that keeps the cultural identities of each knowledge body whilst the convergent/hybridisation form gives hybrid knowledge, which is neither western science nor indigenous knowledge. In Hewson's (1988, p. 325) words, this convergent integration comes from "[t]he successful interaction between two cultures based on mutual respect [that] involves dialogue, the results of which may be different types of science."

Battiste (1986, 2002, 2005, 2008), Simpson (2004) and Garroutte (1999) are of the view that the hybridisation or convergence is likely to result in the dominant western science "swallowing" the dominated indigenous knowledge. Supporting these concerns, Gaskell (2003) argues that, in this common field of play (hybrid space), western science will be at the forefront and remain visible. Instead of decolonising indigenous knowledge, convergent integration strategies are most likely to perpetuate its subjugation. Such scholars provide an integration alternative strategy. This is to first develop indigenous curricula within its perspective and contexts. This independent strategy is likely to provide a full cultural identity to indigenous knowledge without disintegrating it and distributing its fragments into different syllabi. It can be argued that such an approach is likely to elevate the status of indigenous knowledge because this separatist approach concurs with the principles of divergent integration proposed by the CACS model of Mpofu, Otulaja and Mushayikwa (2014). In principle, my view is that the synergistic/parallel integration potentially caters for the identity losses and continued dominated concerns. This is because this side-by-side integration strives to recognise fully the cultural contexts of each knowledge body.

Some indigenous scholars, for example Dei (2000), Oddora Hoppers (2002) and Linda Smith (1999), have adopted an activist integration approach. They reveal the bitterness held by some indigenous people caused by the suffering that colonialism has created. Activism can evoke in indigenous people and communities malicious colonial memories that may instigate

emotions of reprisal. This being the case, activism potentially leads people into interpreting the continuous exclusion of indigenous knowledge in school curricula as perpetuating the abuses of colonialism. This can be worsened by the denial of the value of indigenous knowledge expressed by scholars like Horsthemke (2008), and perceptions of it as being romanticised (Atwater, 1994; Briggs, 2005). To affected indigenous people, such labels can be interpreted as tools that discourage the integration agenda and return dominion and privileges to western science. Activist approaches to the integration of indigenous knowledge in science education potentially raise tensions and politicise indigenous people into "deconstructing the privilege and dominance of western science" (Dei, 2010). This can turn into a radical approach to integration that involves displacing the western science and replacing it with the indigenous knowledge in classroom science. Such an approach resonates well with the assumptions of substitutive integration of the quadruple model (Mpofu, Otulaja, & Mushayikwa, 2014).

Besides inferring substitutive integration from indigenous knowledge and western science activist discourse, to my knowledge, no nation has as yet made such a curriculum movement. Instead, many nations are attempting to place it in existing western science framed curricula. This is because other indigenous people and "Africans cannot avoid becoming part of what the west has achieved in the world, without forgetting that they, too, have something to offer from their cultures and knowledge" (Shizha, 2010, p. 46). Such nations realise that centuries of colonialism have made western institutionalised schooling part of indigenous nations. As such, they accept the advantages of such systems over their indigenous systems. For example, writing and documentation has become part of indigenous life. It is inevitable that indigenous knowledge is documented and placed in the school curricula, particularly in sciences. However, such documentation need not compromise on the fundamental cultural identities of indigenous knowledge.

Despite the diversified views on the integration of indigenous knowledge and western science at classroom science level, many nations are pursuing this reform, including Zimbabwe. The rationalities for such integrated reforms given in literature are many. However, at classroom level, they cause double vision in the learner. In the next section, I discuss literature in relation to this visionary goal.

2.5.3 A double "visioning" rationale

The most fundamental goal of integrating indigenous knowledge into classroom science gleaned from literature is to double "vision" learners, rather than single "vision" them. In

other words, classroom science needs to develop in learners the capabilities to understand the world from two ways of knowing, that is, indigenous and western science (Aikenhead, 2001; Barnhardt, & Kawagley, 2005; Brayboy, & Castagno, 2008). This goal is grounded in a two tiered integration argument. Firstly, indigenous learners experience science learning problems when taught western science detached from their cultural knowledge. Secondly, the problems experienced when learning science by these children could be minimised if the classroom science is aligned to their cultural knowledge.

As highlighted in section 2.5.1 above, western classroom science creates cultural and cognitive dissonances in indigenous learners (Le Grange, 2007; Shizha, 2010). Cultural dissonance refers to "the disturbing inconsistency between the African students' cultures and the science curriculum that is taught in African schools" (Shizha, 2010, p. 38). Cognitive dissonance, therefore, arises when children fail to link the knowledge they already hold and how they have gained it with what they are being taught and how they are being taught. Literature reveals that these dislocations are the consequences of children learning western science. They include difficulties in the comprehension of western science being taught (Aikenhead & Jegede, 1999) and the loss of cultural identity (Shizha, 2010). Failure to resolve cultural dissonance in science classrooms is tantamount to assimilative negative experiences (Aikenhead, 1996). "This situation can create hazards for many students, hurt their self-esteem and sense of self-efficacy, and ultimately inhibit their learning" (Aikenhead & Jegede, 1999, p. 269). Eventually, such learners may lose interest in school science and may even abandon science subjects or even schooling (Malcolm, 2007). Other children may end up abandoning or marginalising their own knowledge as they become assimilated into western scientific worldviews (Aikenhead, 1996).

The introduction of the integration of indigenous knowledge and western science in educational programs in many nations, western or indigenous, are viewed as "bring[ing] learners closer to their cultural identities and experiences leading to a science that is learner friendly and meaningful" (Shizha, 2010, p. 43). In Australia, Aikenhead (2001) refers to such programmes for the Aboriginals as "cross-cultural science". In Africa, particularly South Africa, Jegede and Aikenhead (1999) describe them as "cultural-sensitive science", and Brayboy and Castagano (2008) and others in Alaska call them "culturally responsive science education". Fundamentally, the assumptions of all these programs resonate well with that of the "Two-Eyed Seeing" of Hatcher et al. (2009).

To support this double vision goal, none of the scholars contributing to culturally aligning

classroom science dialogues approve of substitutive integration. Brayboy and Castagno (2008) have also made a similar observation wherein scholars in culturally responsive schools suggest a "both/and" approach, rather than an "either/or". Most stakeholders in science education support this double visioning integration goal but how this double visioning is developed in the learner has remained theorised, leaving a gap in the literature. For example, with the application of the synergistic approach of Barnhardt and Kawagley (2005), indigenous knowledge and western science aspects are drawn together in ways that retain the cultural identity of each component. My argument then is that it is the indigenous knowledge aspects in classroom science that aligns with the background knowledge of the learners. Otherwise, the western science aspects of such integrated classroom sciences remains disconnected. This "softens" the classroom science into a more culturally friendly subject in the indigenous knowledge aspect. The reality still remains that the western science aspect remains alien to indigenous people. Even though children may look forward to learning the indigenous knowledge, they may still experience cognitive dissonance when they cross the border to the learning of western science. How then can science teachers enable all students to study a western scientific way of knowing and, at the same time, respect and access the ideas, beliefs, and values of non-Western cultures (Snively & Corsiglia, 2001, p. 24)?

In response to this question, these authors propose that double vision teaching should aim to convince learners not to accept the validity or legitimacy of the western scientific knowledge. Instead, it should aim at facilitating their understanding it as the "other" way of knowing. This leads learners into establishing the similarities and differences between the western science understanding of the world and their own. Science teachers are being called upon to adopt pedagogies that are appropriate for the integrated classroom science. Not only pedagogical shifts are required but also shifts in goals, resource materials, classroom enterprise composition, among others, must become desirable in order to support new approaches to teaching (Brayboy & Castagno, 2008; Ogunniyi, 2007a). In the next section, I discuss the content matters in relation to integrating indigenous knowledge into classroom science.

2.5.4 Indigenous knowledge content

One of the major challenges teachers have been facing in their attempt to teach indigenous knowledge relates to what aspects of indigenous knowledge can form classroom science content (see Mpofu & Muropa, 2015). This is because little of it has been documented. The lack of documentation has been revealed by many studies including Shizha (2010) as one of

the major factors that makes it easy for people, such as teachers, to ignore African IKS in favour of western knowledge systems. This makes documenting indigenous knowledge for the purpose of classroom sciences important (Hewson, 2012; Òtúlàjà et al., 2011). Such thoughts are influenced by the tradition that teachers are provided with teaching resources from which to draw examples of content to teach. However, it is important to note that not all indigenous knowledge can be documented and that, in some cases, its documentation may result in losses. But, awareness of such possibilities shows knowledge documenters the importance of adopting strategies that minimise such losses. Perhaps, in Zimbabwe, we can draw documentation of indigenous knowledge from other parts of the world, such as Australia, United States of America, New Zealand and Canada who have pioneered such projects (Aikenhead, 2002; Barnhardt, 2007; Harrison & Papa, 2005). This needs to be done with the full awareness of different contextual factors that may demand different strategies.

To Thaman (2009), the content of education is underpinned by a particular culture. This makes the exclusion of cultural knowledge in education programmes impossible or unjust. The question this raises is what should this content be? Shizha (2010, p. 44), Keane (2008) and others concur that "there are many indigenous knowledge systems that can be integrated into the science curriculum in African schools". Topics for integration include ecological sustainability that requires

> a patient and systematic effort to restore and preserve traditional knowledge of the land and its functions … this is knowledge of specific places and their peculiar traits of soils, microclimate, wildlife, and vegetation, as well as the history and the cultural practices that work in each particular setting (Orr, 1994, p. 32).

Hewson (2012) outlines the indigenous knowledge aspects of topics that include animal and plants species that could be included in the Lesotho and South Africa science curricula. She agrees that some of these topics involve knowledge easily incorporated into a western syllabus (e.g. the Rooibos), while other topics (e.g. the Candelabra tree) can easily be dismissed because they involve knowledge outside the western scientific realms. Keane (2008), in her study on science education and worldviews in two schools in rural communities of Africa, reveals themes such as history, medicine, nature, water, time and *Ubuntu* that could be incorporated into school science. She underscores the need for "educators and curriculum designers in South Africa to understand the role of worldview related to these themes" (p. 610). Similarly, Khupe (2014) identifies several possible topics, including indigenous medicine that could be taught within context of the South African curricula. She reinforces the importance of including the spiritual and community value

aspects into the curriculum on the basis that they are critical cultural identifiers of the Zulu community of Mqatsheni. Though these studies hint that indigenous medicine is a possible theme for inclusion into school science, they do not provide insights into what actually can be taught under this theme. My study fills in this gap. From my extensive literature review, I am strongly convinced that no such studies that aim to document indigenous knowledge content in the format commensurate with classroom science have been conducted in Zimbabwe.

While lessons can be drawn from such studies conducted elsewhere, the content they have suggested is difficult to place into curricula of different localities because of the place-based nature of indigenous knowledge. Communities might share some aspects of a particular form of indigenous knowledge such as indigenous medicine; however, due to differences in socio-cultural and historical context, the knowledge is likely to vary from community to community. In addition, despite the mushrooming of research on indigenous knowledge in science education, the specific area of indigenous medicine seems to be lagging behind. In addition, this area, as I have discussed in the previous section, is least understood by many educators, particularly those with the western cultural background. This makes studies like mine imperative in light of the value most people, indigenous and non-indigenous, attach to indigenous medicine for the daily management of their health.

The indigenous knowledge aspects suggested by the above cited studies interpreted within the E3P knowledge model of the CACS presented in section 2.2.1 above inform decisions on what indigenous content knowledge could be included in classroom science. These content areas include the indigenous knowledge holders that, in this study, are the healers (enterprise), the nature of indigenous knowledge, including spirituality and *Unhu* (paradigm), indigenous knowledge inquiries (process), and representations (product). Equivalents to these domains can be drawn from Castellano's (2000) three broad aspects of Aboriginal knowledge. These are discussed in section 2.4.1 as traditional, empirical and revealed knowledge.

The holistic nature of indigenous knowledge could also serve as a pointer to the aspects of indigenous knowledge that could be integrated into classroom sciences. It implies that all the parts are inextricably connected. As such, the bigger whole (e.g. indigenous knowledge) is made up of representative smaller wholes such as IKoPH. Indigenous knowledge is understood as a complex system. Thus, in selecting indigenous knowledge for classroom science, the ultimate goal needs to be the selection of aspects in the smaller whole that provide the full cultural identity of this knowledge body. Above all, indigenous knowledge is

people's cultural heritage resource whose ultimate custodians are the ancestral spirits of a particular community (Mpofu, Mushayikwa et al., 2014a). Such awareness requires that integrators of indigenous knowledge into science classrooms consider the voices of knowledge holders beyond the boundaries of the second world in considering what indigenous knowledge to include in classroom science.

It is important to note that, without content, there is nothing to teach. But the content needs to be accurate, appropriate, relevant and representative of the body of knowledge from which it has been drawn. However, not only content to teach is of great importance for classroom practices aiming at the double visioning, but the adoption of appropriate pedagogical approaches should be considered to be of equal importance. In the next section, I discuss some pedagogical approaches that are recommended for the integration of indigenous knowledge into classroom science literature.

2.5.5 Pedagogically "fit" approaches

Indigenous scholars (e.g. Dei, 2010; Hewson, 2012; Nichol, 2011) generally hold the same view that pedagogical approaches need to support the incorporation of indigenous content into classroom science. Such methods should be harmonious with the indigenous learners' styles of learning. In this regard, Dei (2010, p. 83) believes that the indigenous pedagogies underpinning these symbols of culture can be teased out by "examining the specific instructional, pedagogic, and communicative values and challenges offered in these teachings". He therefore advises educators "to explore and understand the particular teachings central to the African cultural resource knowledge base through local proverbs, parables, fables, myths, and folktales."

Indigenous pedagogies are an emerging field in science education. The construction of such approaches for classroom science can be informed by various indigenous ways of knowing that are inclusive, intergenerational oral transmission and observations of nature. Nichol (2011) offers one indigenous pedagogy model from which science educators can draw lessons. This model is two pronged. Firstly, the holistic feature draws from the indigenous learners' tendency and preference to understand phenomena from integrated teachings. These teaching approaches are oriented towards real life experiences and are more reflective of the holistic nature of indigenous worldviews. They interrelate knowledge and skills across school subjects. Nichol (2011) describes the second dimension as "being relatively unstructured and consist[ing] of thoughts, images and experiences of learning". This feature is mainly grounded in the educational function of cultural symbolic activities such as rituals and

ceremonies. During such functions, learners learn through observation and involvement and by being present.

Both holistic and image aspects of this model utilise teaching approaches that support indigenous children's learning styles. Castagno and Brayboy (2008, p. 954) in the literature they reviewed on Culturally Responsive Schooling for Indigenous Youth provide the most cited learning styles for indigenous learners as, among others:

- Hands-on
- Connecting to real-life
- Observation proceed performance
- Participating in the real world
- Reflective
- Naturalistic
- Holistic
- Direct experience
- Creative
- Visual

The study by Hewson (2012) in Lesotho and South Africa provides concrete examples in which teaching could be connected to learners' lives in the community. These include story telling (myths, cases), physical and cognitive games (e.g., riddles), and experiential learning (e.g., field trips to the countryside, zoos, and botanical gardens). In addition, indigenous pedagogies need to incorporate techniques that support socialised relationships, such as: meanings of respect, listening and speaking. It is therefore necessary to create adequate time between activities and question and answers to allow for such culturally shaped introspection behaviours (Brayboy & Castagno, 2008; Castagno & Brayboy, 2008).

It can be inferred from the foregoing discussions that indigenous pedagogies enhance the learning of science from the indigenous frame. But the goal of integrating indigenous knowledge into classroom sciences is to double vision the learner, that is, to develop in the learners the ability to understand the studied phenomenon from the indigenous frame as well as the western scientific frame. This evokes the question: How could this be pedagogically achieved? One answer to this question is that the double visioning of the learner can be achieved by cultural border crossing over to the western scientific pedagogical frame from the indigenous pedagogical frame. This is then followed by a comparison between western science and indigenous ways to establish similarities and differences without presenting any one way of knowing as superior. The Rekindling Traditions curriculum illustrates this approach (Aikenhead, 2001). Within this curriculum for Aboriginal indigenous learners, teaching begins from an "Aboriginal framework" and then proceeds to the Western science concepts "as useful knowledge from another culture" (p. 343). Aikenhead (2002) explains that this approach makes explicit both indigenous and western knowledge, values, and assumptions and the framework of operation at any one point.

The literature discussed here shows that, like content, pedagogical issues are certainly important to translate the goals of integrating indigenous knowledge in classroom sciences into reality. Given that teachers are critical agents of any curriculum reform, the preceding discussions imply that teachers need to acquire a particular set of attributes in order to engage effectively in classroom practices that support the effective integration of indigenous knowledge into classroom science. Such attributes can be inferred from the teacher related challenges. These include developing a positive set of dispositions, attitudes and values towards indigenous knowledge and its integration with western science at classroom level, understanding the nature of indigenous knowledges and developing teaching materials (content and pedagogy), among others.

An unfortunate finding in the literature is that, in Zimbabwe, science teachers generally seem to be ignoring the call to integrate indigenous knowledge into classroom science (Dziva et al., 2011). A plausible reason drawn from this review of literature is that these teachers may genuinely not know what to do in terms of content and pedagogy. This reform seems to be too complex and demanding for the teachers to uphold without support. This explains the observations that Zimbabwe, and probably other similar nations, are still grappling with translating the ideals of integrating indigenous knowledge and western science at classroom level into reality. Conversely, notable achievements and progress towards integration of indigenous knowledge and western science at classroom level are exemplified in programs in Australia, America New Zealand and South Africa from which we can draw lessons. In the next section, I highlight three such programs.

2.5.6 Cases of notable achievements

Integration achievements have success stories as well as challenges. We can learn from the success cases to craft local integration strategies. In this section, I start by briefly highlighting the Alaska Native Knowledge Network (ANKN), Rekindling Traditions for Aboriginal Students (Rekindling traditions), and the Science and Indigenous Knowledge Systems. Then I discuss their implications for this study.

The first programme, ANKN (Alaska integrative curricula) was set out

> to systematically document the indigenous knowledge systems of Alaska Native people and develop school curricula and pedagogical practices that appropriately incorporate local knowledge and ways of knowing into the formal education system (Barnhardt, 2008, p. 117).

The project was grounded on the Old Minto Cultural Camp in acknowledgement of it as a reservoir of indigenous knowledge of the people of Alaska. For over two decades, Alaska Fairbanks University, in cooperation with the Cultural Heritage and Education Institute of this village, has been offering a cultural immersion experience program for teachers, students and visitors. The inception of Alaska Rural Systemic Initiative (Alaska initiative) has capitalised on this indigenous knowledge cultural resource site and involved the Elders of this cultural centre in documenting indigenous knowledge of the people of Alaska for the formal system, "Elders and Cultural Camps has become one of the key initiatives that have been implemented over the past ten years" (Barnhardt, 2008, p. 117). Thus, this informal project [Alaska initiative] has informed the Alaska integrative curricula.

The second exemplary programme is known as the Rekindling Traditions, which focussed on developing prototype teaching strategies and materials for culturally sensitive science teaching (Aikenhead, 2002). Student science teachers collaborated with experts in local communities in order to modify a teaching unit or develop a new unit in line with their unique way. The project showed that culturally responsive teaching strategies and materials developed were effective for Aboriginal students in the pilot schools. Teachers involved in the project modelled successful border crossing between classroom science cultures and the culture of the communities. Aikenhead acknowledges that transfer of this innovation into other science classrooms represents an intellectual and political challenge for Canadian science educators. The project recommends that integrative classroom science calls for the re-negotiating of the culture of school science (Aikenhead, 2000). Of more significance, the project acknowledges that negotiation towards a co-existence of two major cultures within the same classroom space calls for collaboration with the custodians of indigenous knowledge in the community.

The final example is the science and IKS project located at the University of Western Cape in South Africa (see Mushayikwa & Ogunniyi, 2011; Ogunniyi, 2006, 2007a, 2007b). The focus of this project is on teachers' understandings, stances and the use of argumentation to support pedagogically the integration of indigenous knowledge and western science at classroom level. The key participants in this project are the teachers and learners within their classroom contexts. Several authors working on the project have noted the impact of the project on teachers that include more sensitivity to learners' socio-cultural backgrounds, improved levels of understanding of the nature of indigenous knowledge and recognition that this body of knowledge is a valid and alternative system to western science. For example, Ogunniyi and Hewson (2008) reveal how teachers' conception of, and awareness about the nature of both

indigenous knowledge and western science was enhanced by this pedagogical intervention. As such, science and IKS recommends that the integration of indigenous knowledge into classroom science requires that teachers be developed through "dialogue, argumentation, role modelling and explicitly reflective instructional approaches" (Ogunniyi & Ogawa, 2008, p. 183) over an extended period.

The examples of Alaska integrative curricula, Rekindling Traditions and science and IKS are offered with the intention of drawing supporting features for research aiming at informing classroom practices involving the integration of indigenous knowledge and western science. The Rekindling Traditions and the Alaska integrative curricula, share the element of the participatory involvement of Elders as custodians of indigenous knowledge within their communities. This is important for authentic and ethical access to indigenous knowledge. In addition, it leads to the development of culturally appropriate resource materials and pedagogical frameworks. However, these two projects differ in the nature of community reservoirs from which indigenous knowledge was accessed. The Alaska integrative curricula utilises a village informal centre whilst the Rekindling Traditions accesses the knowledge directly from the community. This provides alternative reservoirs from which to access this cultural resource. The science and IKS involves teachers and learners within the classroom contexts. This implies that indigenous knowledge accesses are limited to the teacher and learner participants and therefore do not involve the community Elders. Given that indigenous communities hold the larger portion of indigenous knowledge, their exclusion in the science and IKS project evokes ethical and authenticity questions. Such issues potentially render the project ineffective. Furthermore, argumentation aligns with western cultures and is not commensurate with indigenous cultures. The use of this western oriented pedagogical approach might uphold the superiority of western cultures at the expense of indigenous knowledge. However, if augmented with an indigenous framework, then it becomes an effective alternative way of knowing.

The achievements registered by these three projects do not mean they have been unproblematic. Substantiating this assertion is the report that the Alaska integrative curricula took ten years to register a positive impact on learners' scholastic achievements from its inception (Hill, Kawagley, & Barnhardt, 2006). The Rekindling Traditions project acknowledges the problems of extending its prototypes to the larger community of Canada. The science and IKS emphasises that this professional development intervention takes a long time to affect positive changes in teachers. All this reinforces the complexities inherent in the task and the process of integrating indigenous knowledge into classroom science. These cases

illustrate that there is not only one way to integrate indigenous knowledge into classroom science, rather, several strategies can be developed and implemented. More importantly, these cases have demonstrated that, though difficult, the integration of indigenous knowledge into classroom science is an attainable goal. However, it calls for systematic and well thought out research to inform classroom practices.

Simply placing content and pedagogical models designed for different localities into localities like the Tendera community is to underestimate the effects of the localness of indigenous knowledge. Hence, a study, such as this one, which looks at the same phenomenon, but from a Zimbabwean's perspective, and using a different approach, is needed.

2.6 In conclusion

The literature reviewed in this chapter has shown that the integration of indigenous knowledge and western science at the classroom level is shrouded in many complex theoretical and practical interrelated factors. It is then not surprising that, in Zimbabwe, science education stakeholders have not been able to model the integration of indigenous knowledge and western science at classroom level. It has been left to teachers at individual classroom level to find out for themselves how to do it. Given that the Zimbabwean teachers' academic and training backgrounds are grounded in western oriented systems of education, it is not surprising that, if no such frameworks are provided, the realisation of this curriculum reform remains futile. This review of literature has also revealed that a few studies done in Zimbabwe have tended to focus more on the attitudes of teachers and the indigenous knowledge they hold. As such, researching into indigenous knowledge and classroom science for the purposes of providing practical insights into the integration of this knowledge at classroom science levels has become a neglected area. This being the case, such research foci in Zimbabwean localities, such as Tendera community, is warranted. The community of Tendera is the location of this study whose context description is the subject of Chapter Three.

3 CHAPTER THREE: THE COMMUNITY OF TENDERA

3.0 Introduction

The process of integrative classroom science is not universal, but rather contextual. This is because everything makes sense within a specific context (Agrawal, 1995) and therefore, largely determines the failure or success of multicultural or integrative classroom science (Aikenhead, 2006). The proposition that the nature of indigenous knowledge, classroom science and their integration need to be understood within the specific context in which they are studied, therefore, makes sense. This study is located in Tendera community in Zimbabwe. But, as much as this local context is understood in this study, it should be borne in mind that no community, regardless of its size, exists alone. Every community is a small part of a district, region, nation, continent and the globe. The local community of Tendera, as a study site, therefore, has to be framed within its extended multi-layered and nested society. Individual, group and community life within Tendera, at any given time, is influenced by multiple interacting societal context specific factors. These factors flow from local structures to larger societies and back dialectically influencing each other because "[e]very person is, in certain respects, like all other people, some other people [and] no other person" (Nyawaranda, 1998, p. 12). Communities like Tendera, regardless of their level in the world, respond to these societal factors differently. These different responses to environmental factors also apply to community units such as individuals, families and other groups of people. In relation to this study, this implies that, in general, people within the community of Tendera, hold common worldviews, knowledge, and practices such as that of healing with plants. Yet, some of these aspects of life vary depending on individual and group dynamics of life. As such, the processes and outcomes of this study are, therefore, best understood from the macro and micro perspectives. The goal of this chapter is to contextualise this study within the community of Tendera, the location of the study. In the next section, I turn to look at the nested field model developed elsewhere (Mpofu, Mushayikwa, et al., 2014a) that guides my discussion of the context of this study.

3.1 A Nested Fields approach

The context of learning or researching about indigenous people and their knowledge incorporates the geographical, social, cultural, spiritual, and physical aspects (Battiste, 2002). This assertion evokes a question: What does context entail in studying integrative classroom science? The Oxford Dictionary Online defines context as "the circumstances that form the

setting for an event, statement, or idea, and in terms of which it can be fully understood." An indigenous perspective of place therefore is important in providing the context of a study that was conducted in an indigenous community, like Tendera, and with indigenous people. This is because the place is integral to the culture and ways of living of indigenous peoples. As such, indigenous knowledge is characterised as locale (Shizha, 2010) or place-based (Aikenhead, & Ogawa, 2007).

Emphasising the connection between indigenous people and their place, Cajete says that "[i]ndigenous people are a people of Place, and the nature of Place is embedded in their language" (Cajete, 2000, p. 74). Therefore, indigenous knowledge is "inherently tied to the land … where ceremonies are properly held, stories properly recited, medicines properly gathered and transfers of knowledge properly authenticated" (Battiste, 2002, p. 13). Cajete (2000) provides a four dimensional and interrelated indigenous perspectives of place that forms assumptions of the nested fields model (Figure 3-1) informing the context of this study.

Firstly, the place is regarded as a locale where the people indigenous to such a place celebrate a history of intergenerational habitation, their cultures and traditions in a way that culturally identifies such a place and themselves (Cajete, 2000). Secondly, this place is regarded as a piece of land that geographically bounds a particular indigenous locale. This land space provides the environment that shapes the indigenous people's shared worldviews (Barnhardt & Kawagley, 2005; Michell, 2005). Thirdly, the place is relational in that it is where indigenous people interconnect and interdepend on each other, their ancestral spirits and other elements, as plants (Cajete, 2000). The fourth and last perspective of place is that of place as experiential, meaning that it provides people with lived experiences.

The nested field model shown in Figure 3-1 below is in accordance with the above perspective of place. It shows that humans live in a land that is geographically located in the world. Humans' ways of living that include knowledge construction, sharing and consumption, are therefore dependent on the culture of the people who inhabit a particular land. In other words, the land, its people and their ways of life constitute a community like Tendera.

This model presumes Cajete's (2000) frame of place that people, like those of Tendera community, hold cultural knowledge that has been constructed within their localities. They express such knowledge through cultural symbols such as ceremonies, songs, proverbs and artefacts, in their day-to-day living.

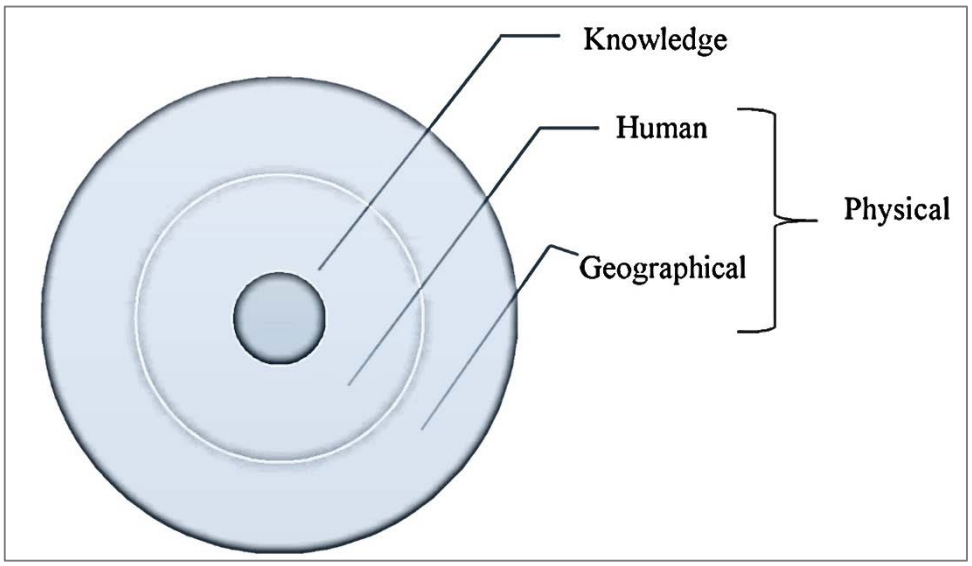


Figure 3-1: Nested fields (adapted from Mpofu, Mushayikwa, et al., 2014a, p. 167)

Within this nested model, the geographical and human aspects make up the physical field. In this physical field, the geographical sub-field provides the environment for people's living experiences. As such, the community life and thoughts relate to interactions among people and with their environment. Such knowledge, thoughts or intangibles become difficult to access because they are largely locked in people's minds (Mpofu, Mushayikwa, et al., 2014a). The access to IKoPH problem is worsened by its secretive tendencies (Keane, 2008). For many centuries of colonialism in Zimbabwe, cultural knowledge has been relegated to primitiveness (Shizha, 2010) leaving its holders with no choice but to privately value and use it (Kazembe, 2010). People lock their cultural knowledge in their minds for fear of exposing their "primitiveness" in this "modern" world. They also hold knowledge of healing from Christian and western medicine worldviews in addition to their own indigenous worldviews. Both Christian and western medicine worldviews tend to dominate the indigenous worldviews. Given the history of western researchers during colonialism who researched indigenous people with the intention of marginalising them and exposing their primitiveness (Matsika, 2012), indigenous people may be reluctant to release their innermost knowledge. Despite the present recognition and re-surfacing of cultural knowledge such as IKoPH, accessing it from communities and knowledge holders, particularly for research, becomes a complex process that calls for the negotiation of the physical, human and knowledge fields (Mpofu, Mushayikwa, et al., 2014a).

This nested fields' model, therefore, gives credence to this study's nested contexts, not only to guide subsequent research stages, but also to bridge them to the literature and the study problem covered in the previous chapters. I discuss this context under four main headings,

namely, Zimbabwe homeland, the rural community of Tendera, the Zimbabwean health system, and institutionalised education. In my discussion of this context, I move from the physical into the knowledge domain through its human repositories (see Figure 3-1 above). The community health contextualises IKoPH within the community of Tendera. The institutionalised education contextualises classroom science in this community. IKoPH and classroom science are knowledge forms whose possible integration is being explored in this study. In order to do so, I triangulate my experiences, literature and fieldwork data. These methodological issues are elaborated in Chapter Four.

3.2 Zimbabwe homeland

The culturally aligning classroom science (CACS) model discussed in the previous Chapter Two (section 2.2.1, p. 26) frames integrative classroom science within an African-Zimbabwean context (Mpofu, Otulaja, & Mushayikwa, 2014). The word "African" self-reflects that the study was done on the continent of Africa. Similarly, the term "Zimbabwean" describes the national context of this study. In positioning myself in Chapter One (see section 1.5, p. 18) I demonstrated that a name, especially an indigenous or English transliterated from Shona, in Zimbabwe, is not merely a label but rather a cultural symbol of an identity. As such, the influences that the national context of Zimbabwe exerts on the Tendera community can best be understood from the nation of Zimbabwe's cultural symbolic identity.

Studies in history and archaeology define Zimbabwe from two of its Shona dialects, *Zezuru* and *Karanga*. Within the dialect of *Zezuru*, the name Zimbabwe relates to *dzimba-hwe,* the venerated houses of chiefs or their graves (Garlake, 1973). In *Karanga*, this name originates from *dzimba-dza-mabwe* that means large houses of stones often linked to the ancestral city of Great Zimbabwe (Vale, 1999). Drawing from my Shona-Karanga background, common to both of these two Shona dialectical views of Zimbabwe is the link of this name to ancestors, and therefore, sacredness and spirituality. This dialectical information helped me to establish the *vaShona* linkages and variances I need to understand in my search for the solutions to the problem I studied within the micro-level context of Tendera community in Chiweshe.

The designs and ownership of the Great Zimbabwe structures are controversial between British settlers and indigenous Zimbabweans (see Garlake, 1973; Vale, 1999). These two camps even value the Great Zimbabwe structures in different ways. To Africans, the Great Zimbabwe is an ancestral shrine, a national cultural symbol or heritage that needs to be conserved and preserved. Yet to colonialists the structures are a source of economic gains through tourism and hospitality. As a shrine, it can be explained in terms of the place theory

of Cajete (2000) that interlinks the spirits, people and physical elements that fits it into the indigenous worldview of interconnectedness (Michell, 2005) described in detail in section 2.3.4 (p. 38). Accordingly, “the history, lifestyle and economic foundation of Zimbabwe are rooted in and around land and its use” (Chigwada, 2005, p. 103).

Zimbabwe is a landlocked country in the Southern region of the African continent. It became politically independent on 18 April 1980 from the British colonisers. It was known as Rhodesia following the partitioning of Africa into European colonies. This country is based on an agricultural economy. It is divided into five main natural regions or agricultural and ecological zones. These five regions are identified as one to five according to differences in effective rainfall and farming systems. Tendera community is a rural place in Chiweshe district and falls under region two that practices intensive farming. In Zimbabwe, a year life circle progresses through four seasons, however, these seasons significantly overlap into two distinct and noticeable seasons: the cool to cold-dry season that runs from April to August and the hot-wet season that covers October to March. This agricultural context became one of the major factors that influenced my fieldwork itinerary described in Chapter Five.

In addition to the natural region divisions, Zimbabwe is sub-divided into ten administrative provinces as shown in Table 3-1 below.

Table 3-1: The location of major ethnic groups in Zimbabwe

Province	**Type**	**Ethnic group**
Bulawayo	Urban	Ndebele
Harare	Urban	Zezuru
Manicaland	Urban and Rural	Manyika
Mashonaland Central	**Urban and Rural**	**Zezuru**
Mashonaland East	Urban and Rural	Zezuru
Mashonaland West	Urban and Rural	Zezuru
Masvingo	**Urban and Rural**	**Karanga**
GMatabeleland North	Urban and Rural	Ndebele
Matabeleland South	Urban and Rural	Ndebele
Midlands	Urban and Rural	Karanga

As Table 3-1 above is showing eight of these provinces, apart from Bulawayo and Harare, have urban and rural parts. Bulawayo and Harare are referred to as metropolitan provinces because they cover urban communities only. The provinces of the location of this study, Mashonaland Central, and that of my maiden home, Masvingo, are highlighted in bold text. The distribution of dominating ethnic groups across the provinces is also shown in Table 3-1. As can be inferred from this table, there four dominant indigenous languages spoken in Zimbabwe. The three indigenous languages: ChiZezuru, ChiKaranga and ChiManyika are Shona dialects. Their domination in seven provinces shows that Zimbabwe is mainly dominated by the Shona people. The fourth is Ndebele. However, there are also other languages spoken representing minority ethnic groups in Zimbabwe. The amended Constitution of Zimbabwe has made such indigenous languages recognisable. Section 6 of this constitution officialises sixteen languages- Chewa, Chibarwe, English, Kalanga, Khoisan, Nambya, Ndau, Ndebele, Shangani, Shona, sign language, Sotho, Tonga, Tswana, Venda and Xhosa (Constitution of Zimbabwe, 2013). Among these are additional Shona dialects, such as ChiTonga, ChiKalanga and ChiNdau. I have observed that some Shona dialects are also spoken beyond Zimbabwean borders in Botswana, Zambia, South Africa, Mozambique, and residents on land bordering Zimbabwe. This concurs with linguistic authorities such as Mazarire (2009) and Chabata (2007).

Historically, the *vaShona* first peopled Zimbabwe followed by the Ndebele people (Shoko, 2006a). These two Bantu-rooted ethnic groups are reported to have displaced the Khoisan people who inhabited this land. Prior to colonialism, most of the languages that now form the dialect of Shona existed independently. The name “Shona” was instituted in 1931 by the Dokean commission (Chabata, 2007; Mazarire, 2009) when only ChiZezuru, ChiManyika, ChiKaranga, ChiNdau, ChiKalanga and ChiKorekore were recognisable. The ChiZezuru dialect made up the standardised ChiShona and the Ndebele became the only two officially recognised indigenous languages (Chimhundu, 1992; Ndhlovu, 2006). By making ChiZezuru as the standard Shona over other dialects, Doke’s work did not only create intra-dialectical hegemony, but also language border crossing learning difficulties in schools. Today, the standard approach of ChiShona has been abandoned in schools. However, the Dokean legacy still exists in broader societal levels with ChiZezuru dominating over other Shona dialects. The language diversity and imbalances add yet another complex dimension into cultural complexities already characterising the studies involving indigenous knowledge. The central question evoked here is: whose indigenous knowledge is appropriate for inclusion into a national and universal curriculum, such as the ZJC?

The language position of the Constitution of Zimbabwe is attempting to re-dress colonial inflicted language imbalances. However, English has remained dominant over indigenous languages, despite the fact that the numbers of minority English speakers have drastically dropped since 1980, the year of independence. The use of English in official communications (e.g. administration, law and schools) is still a diglossic colonial legacy. Applied to monolingual societies, diglossia describes the mutually exclusive "high" and "low" situational use of the same languages within the same community (Ferguson, 1959). In relation to multilingual societies like Zimbabwe, it refers to the high use of English in official communication at the expense of indigenous languages (Chimhundu, 1992; Mashiri, 2002). As a consequence of colonialism, a majority of indigenous people in Zimbabwe are bilingual and can speak both their indigenous language and English as second language.

In Zimbabwe, "the relationship between religion, land and the people has always been close" (Shoko, 2006b, p. 5). This makes Zimbabwe more traditional than Christian even though the people of Zimbabwe embrace multi-religious practices. Historical events, such as the Chimurenga wars, support this assertion. It is said that the first Chimurenga war (1896-1897) and the second Chimurenga war (1966-1980) for independence were spiritually guided (Shoko, 2006a, 2006b). In such events, songs symbolising indigenous practices of Zimbabwe are sung. Examples of such songs include "*Zimbabwe ndeyeropa yemadzibaba*" which in English means "Zimbabwe came out of our forefathers' blood" and "Chaminuka *ndimambo*", that is, Chaminuka is the Great Spirit and king of Zimbabwe. At the centre stage of such events are Great Spirits who play their roles of guiding traditional chiefs. Even today, these traditional chiefs are part of Zimbabwe's House of Assembly. It is therefore no surprise that following the third Chimurenga war of August 2006, over the land reform, the chiefs, in their own capacities and as government proxies, held celebratory national rituals refered to as v*mapira* in Shona (Shoko, 2006b). This, I believe, is evidence of the spiritually-centred worldviews grounding this nation.

The national and international contexts of this study described above show that the colonial powers took no notice of the indigenous Africa's cultural, religious and linguistic inheritance. They made concerted efforts to eradicate all the indigenous systems of life and assimilate Zimbabweans into their western ways of living. These contexts exert complex influences on the indigenous Zimbabweans' lives today, which some participants describe as "modern"[6]. Moving inside this contextual nest, I now discuss locating my study in the rural community

[6] The term modern describes the lifestyles in the current era associated with by western culture influences

of Tendera in Chiweshe district of Mashonaland Central Province.

3.3 The Rural Community of Tendera

Mashonaland means "the land of the Shona people" (Matsika, 2012). The vaShona people dominate in seven regions of Zimbabwe as shown in Table 3-1 above. Three of these provinces are named Mashonaland in particular reference to the *Zezuru* people. For clarity purposes, I identify the *Zezuru* people involved in this study as Tendera participants because they are from the community of Tendera.

In this section, I present the local setting of this study. I focus on aspects that are specific to this context. I discuss this context using Excerpt 3-1, a conversation I held with Mr Choto, a senior Education Officer in the Ministry of Education, who participated in this study within the key category (see Appendix A-01).

Excerpt 3-1: Tendera is a complex community

Mr Choto: African culture … is that not so?

VaKustigira: Yes, healing with indigenous plants.

Mr Choto: Are you still an African … do you know ChiZezuru … you are a Karanga from Chivi (*laughs sarcastically*) where that old lady cooked stones and drank soup.

Vakutsigira: Yes to Chiweshe. What am I supposed to do?

Mr Choto: It's a job mother in a Zezeruland mother ... Umm … I cannot help here. Myself, I come from near Moza (A short version of Mozambique), *kuma* Korekore. But to bite your ear *ma*Chiweshe has it? Have you been there before?

Vakutsigira: No, I only know about the place from my husband's family history. My father in-law's grandfather migrated to Mhondoro from there. Actually, we are known as Chiweshe people in our Gokwe rural home where my family has now settled. But none of us has ever been there. I will be the first one … So, how do I know ChiZezuru.

Mr Choto: *Inzembe* (referring to the migrating habit of my husband's family similar to that of Namaqua dove) … Umm … use "Kombis"[7] on your first few visits. The Zezuru, A-a … are tobacco farmers … (referring to the study). This is a big story here (Appendix H, 31 July 2012, CT).

[7] A minibus, usually 12 seater, used commercially to transport passengers.

VaKutsigira, as as I discussed in section 1.5 (p. 18) is my culturally symbolic name, which, in this study, I used as one my community access strategies (see Chapters Four and Five). I have literally translated the above conversation from modern Shona to English "so as to remain faithful to the essence of what we were communicating in our indigenous ChiShona dialects" (Mpofu, Mushayikwa, et al., 2014a, p. 173). However, where I run short of an English expression, as was often the case, I put the exact words in parentheses in the language in which they were spoken.

Following Mr Choto's guidance, on Friday the 8th of February 2013, I got into a *Kombi* from Harare to the Tendera community. My strategy was to talk less, see all, and listen actively. After about ten kilometres of travel from Glendale along the tarred road to Centenary, fellow passengers started conversing mostly in ChiZezuru deviating from the modern language (Shona-English code switching) they had been using all the way from Harare, about 61km. Mr Choto's utterances, "know ChiZezuru" echoed in my mind. The Kombi talks introduced me to ChiZezuru. The passengers touched on a wide range of life issues that included welfare, marriage, disputes, tobacco, illness, education and religion, among others. My being limited in ChiZezuru caused to me to miss the meanings of some of the words and expressions spoken. For example, "*Nguva ino hauna waunoona mumisha, muZezuru ari* ***kumakura*** *kana kumasowe*"**.** I could not comprehend the term in bold, but I later figured it out to mean "fields". The phrase meant in literal English that during this time of the day no one is at home, the Zezuru person is either tilling the fields or worshipping. Because farming is the main economic activity in this area, the hint that people were in the fields made sense. In these, early days I did not ask questions, even though I felt like doing so, because I had to first figure out how to probe in ChiZezuru. Reflecting on my conversation with Mr Choto, it reinforced for me the language complexities of conducting cross-cultural studies that I had read about in the literature.

As Figure 3-2 below shows, the Chiweshe terrain, particularly around the Tendera community, is mountainous and most of it is still vegetated naturally. Kamusoko, Gamba and Murakami (2014, p. 256), who were in the area for almost the same period I was also in this field concur with this observation. They describe the area as "a complex landscape of closed and open Miombo woodlands, bush land, grassland and agriculture". Such woodlands are a valuable primary source of firewood, construction poles, medicine and food (Gambiza, Bond, Frost, & Higgins, 2000).



Figure 3-2: Exemplary landscape of Chiweshe

Save for the homesteads along the road that I could see, I could not imagine life in the mountains, behind them, on their tops and bases. As the Kombi picked up and dropped people who immediately disappeared into the mountains and thick vegetation, I was convinced people lived in this place. In fact, according to Zimbabwe statistical records of the 2012 national census, this place is inhabited by about 232 885 people (ZimStat, 2012).

On this first day of my travelling to Chiweshe, I did not realise that the spaces between and surrounded by mountains had good soil for agricultural activities that I had read about in the literature. In fact, Kamusoko et al. (2014) describe these soils as fertile enough to sustain agricultural activities. This agro-economic based life was reinforced by the conversations in the Kombi. Positive things included the good homes that were built and cars purchased from tobacco proceeds. Negatively, they spoke about how marriages were ruined as men disappeared with money from farm proceeds to co-habit with other women in Harare[8]. This is evidence of the agro-based economic life in which farm products like maize, groundnuts, vegetables, and sweet potato are on display for sale all along the roadside all year round. On our way, we also met heavy trucks carrying tobacco bans for auctioning in Harare.

On this very same day, I discovered that Chiweshe was multi-religious, not only from the

[8] Capital city of Zimbabwe

passengers but also from the people gathering for worship in different places on the way to my destination. Each group had robes of a particular colour (green, yellow, blue, and white). I asked the *Hwindi* (conductor) in a whisper about these gatherings because I wished to find out about the religious diversity in the area. He answered me with a raised voice: "*Kariswa muri muenzi, i*Friday *amai*" (By the way, you are visiting here, today is a Friday mother). His response made me uneasy as I had anticipated that he would whisper the answer back to me. The *Hwindi*'s shout generated important contextual information because it stimulated discussions in the taxi about religious practices in the area. Passengers competed to explain to me about religious people in this part of the country. According to them, the different colours of the robes identified different sects of the Apostolic Christian denomination. The Apostolic religion is an addition to traditional Christian denominations such as the Salvation Army, Roman Catholic, African Reformed and many Pentecostal Churches. Whilst the inhabitants of this place bragged about being Christians, the Chief Tendera was concerned over the loss of cultural values brought about by the churches in his area. My stay in the area revealed that many of these people were also strong followers of African traditions and there are numerous traditional healers in the area. But, as was reported in Mpofu, Mushayikwa, et al. (2014a), most of the people hide their traditional practices behind the façade of Christianity.

On my first day in the area, I wondered how the people of Tendera were managing to conserve the woodlands and vegetation of Chiweshe, particularly in the Tendera community. This was in comparison with my two rural home areas, that is, Chivi (by birth and upbringing) and Gokwe (by marriage), where the use of trees by households was causing fast deforestation. As I spent more time in the area, the Tendera's cultural taboo (*zviyera*)-based conservation of the natural environment was revealed to me (see section 6.2.3.5 from p. 215 of the findings Chapter Six).

The Kombi trips gave me insights into the socio-cultural complexities of Chiweshe, in particular those of the community of Tendera, the location of my study. Compounding these contextual complexities are historical and political aspects of Chiweshe that emanate from the national and international fields. Peculiar to this district and the Tendera community is its historical link to the National Spirit of Nehanda. It is recorded in the political history of Zimbabwe that Nehanda lived in the hills of this district. In addition, the second Chimurenga war was concentrated in this district and the entire province. This area is a Zimbabwe African National Union- Patriotic Front (ZANU PF) stronghold. The two link teachers (see section 5.2.1, p. 147 for the detailed description of these teachers' roles in this study) I worked with also hinted to me about the Tendera community's political affiliation. This was reinforced in

earlier sessions with the community leadership. They stressed that wearing red was forbidden in the area, because the colour red is symbolic of the strong opposition party in the area.

Chiweshe district is registered with the Ministry of Local Government, Rural and Urban Development (Ministry of Land Development-see footnote 2, p. 1 for my use of this identity in reference to this Ministry) as Mazowe as shown Figure 3-3 below. My use of the name Chiweshe conforms to the local people's identification of this area. The use of the government's official name of Mazowe is like detaching these residents from the land of their heritage and is perceived by them as undermining their inheritance. If I had done so, I would have jeopardised my chances of getting access to the community of Tendera.

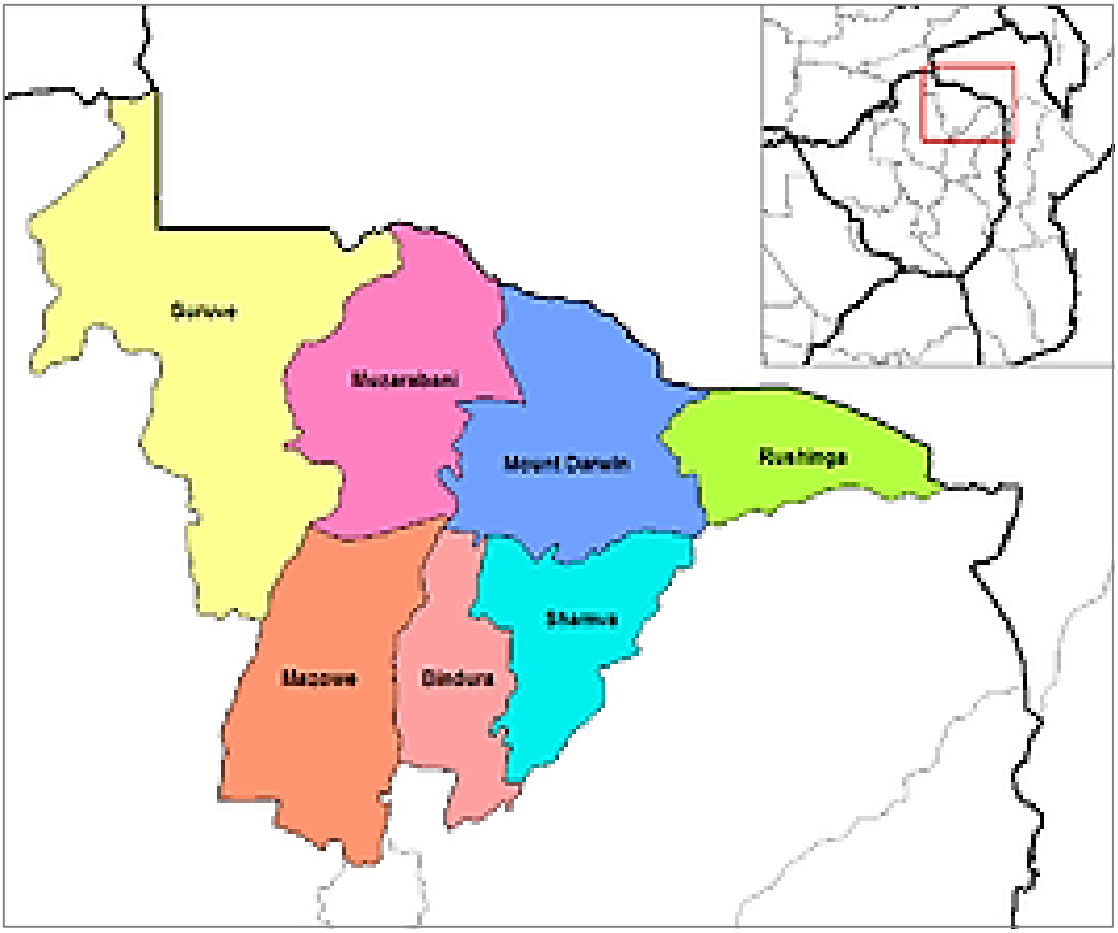


Figure 3-3: Districts in Mashonaland Central Province (adapted from https://en.wikipedia.org/wiki/Mashonaland_Central_Province)

The Tendera people have a complex way of life nested within national and international contexts. Their multifaceted and complex socio-cultural life is embedded in history, religion and politics, among other factors. Given this background, I interpreted Mr Choto's remark that "*KuChiweshe kune zvako*" as "Chiweshe is a place with its own complexities." Essentially, these complexities reiterate the essence of understanding IKoPH in ways specific

to the local context in which it exists.

In the rural community of Tendera, like in other communities, urban and indigenous, are western medical and educational facilities. The western medical services are provided by the clinics and hospitals whilst schools provide the institutionalised educational services. Such western-based services are multileveled, from the ministry head offices through provincial and district levels down to the community of Tendera. Notably, the two services are also provided in the community of Tendera from their own indigenous perspective. In the next section, I provide the context of IKoPH in Tendera within the health system in Zimbabwe.

3.4 The Zimbabwean Health System

Western medicine has roots in western science and worldviews. Western medicine started in England with the Medical Act of 1858. This Medical Act regulated heterogeneous medical practices into a unified system of medicine. Medical practices became an enterprise of western-trained doctors. As Wiese and Oster (2010) contend, the institution of western medicine marked the start of the marginalisation of western indigenous medical practices. The western medicine form was non-existent in Zimbabwe in the pre-colonial period of the eighteenth century. Through colonialism, western medicine gained hegemony over indigenous medicine in colonised countries like Zimbabwe. The western health system was regarded as superior to indigenous ways of managing health. This substantiates the argument that indigenous medicine is a health science in the same way is western medicine (Battiste, 2002; Oddora Hoppers, 2002; Ogunniyi, 2007a).

Colonialism in Zimbabwe regarded indigenous systems as “primitive” (Chavunduka, 2001) as I have discussed before. The whole system of indigenous medicine was represented as unscientific, superstitious and mythical. The traditional healers (the indigenous doctors) were labelled “witch doctors” (Waite, 2000). The colonisers failed to recognise the commonalities existing between indigenous and western medicine that could benefit the management of health. The differences between them, such as indigenous healing’s spirit centeredness, contributed to the entire indigenous healing systems’ castigation by the colonisers as valueless. As an example, the Tendera participants of this research conceptualised illness as either naturally or socially grounded. They considered spiritualism and witchcraft as the main causes of illness (details of these findings are discussed in Chapter Six, section 6.2.2, p.201). This fits within the African indigenous perspective of illness as explained by Chavunduka (2001). The Tendera participants expressed natural causes of illness as “*dzihwa rinosimbisa muviri*”, literally translated as illness that is necessary to strengthen the body. This indigenous

view of natural causes of illness converges with the pathogenic perspective of western medicine. However, African witchcraft and spiritualism are identified as the main causes of illnesses (Frommer, 2003; Shizha & Charema, 2011) and the indigenous medicines' connectedness to land and religion (Chavunduka, 2001) means that there are multiple causes as opposed to that of universal western medicine.

In African communities, western and indigenous medicine have long history of hegemonic relationship (Waite, 2000). In Zimbabwe, missionaries used western medicine to reinforce the colonial agenda (Zvobgo, 1986) and to strengthen their position in the area by providing western medical services. According to Chavhunduka (2001), these missionaries' latent agenda was to eradicate what they regarded as a primitive and valueless African medical system. These missionaries, however, lacked adequate resources and sought the support of the Rhodesian government (Waite, 2000). The challenges faced by the missionary medical services were worsened by outbreaks of pandemics such as smallpox, venereal diseases, tuberculosis and leprosy. This hastened the formation of Native Medical Services for the black people in Rhodesia (now Zimbabwe) which consisted of basic Christian mission and government hospitals and clinics in urban areas compared to the superior facilities made available for whites. The Native Medical services provided westernised medicine and discouraged the use of indigenous medicines. However, these efforts did not deter most Africans from using indigenous medicines and even today the majority of Zimbabweans have remained dualistic consumers of these health services (Chavunduka, 2001; Mpofu, Mushayikwa, et al., 2014a; Shizha & Charema, 2011). The hegemonic relationship between western and indigenous medicine that existed for over ninety years created antagonism between these two perspectives (Matondo, 2000) but indigenous medical practices continued to be practiced in the background.

Independence in Zimbabwe in 1980 brought with it reforms in the political system. Ushewokunze (1984) asserts that, at the same time, the Zimbabwe National Traditional Healers Association (ZINATHA) and the Traditional Medical Practitioners Council Act 38 of 1981 were formed even though these organisations continued to be a contested discourse within the nation and beyond. For example, in 1975, World Health Organisation adopted a provision of primary healthcare for all by the year 2000 resolution (Mahler, 1975). The World Health Organisation (1978) defines primary health care as based

> on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individuals and families in the community through their full

> participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self-reliance and self-determination. It forms an integral part both of the country's health system … of the overall social and economic development of the community. It is the first level of contact of individuals, the family and community with the national health system bringing health care as close as possible to where people live and work.

This definition confirms McElmurry and Keeney's (1999) dimensions of primary health care that are: equity, accessibility, availability of resources, social participation, intersectoral community action and cultural sensitivity. Its emphasis on socio-culturally community-based action and reinforces the integration goal of the two knowledge systems of health. In 1977, WHO followed up its 1975 resolution on primary health care by urging member states to integrate traditional medicine into their health systems (Waite, 2000). Such integration is referred to as either complementary or alternative medicine. Zhang (2001) provides a two way supplementary approach to complementary medicine practices. A supplementary approach refers to the use of indigenous medicine in addition to western medicine. In one way, a nation like Zimbabwe can adopt its indigenous health management practices to supplement those of western medicine. In another way, the nation may adopt indigenous medicines from other nations, for example, Chinese traditional medicines, to supplement western medicine (Magodora, 2014). In my view, this addendum approach prioritises western medicine and subsumes the traditional systems. I argue that such an approach can either maintain or perpetuate a hegemonic relationship between these two systems. In my view, complementary medicine needs to integrate these two health systems in a way that values both equally. Through such an integration approach, people, regardless of origin, harness the strengths of both indigenous healthcare and of western medicine for their benefit.

The Zimbabwe Health System Assessment (Osika et al., 2010) and the 2009-2013 National Health Strategy (Ministry of Health and Child Welfare, 2009) agreed that traditional medicine practices in Zimbabwe are widespread in the country. However, they also report that traditional medicine is regarded as a private sector that runs parallel to the western health system. The practices of traditional healing are regulated by the Traditional Medical Practitioner Act (1996), revised version of the Act (1981). According to this Act, traditional medicine practices include "every act the object of which is to treat, identify, analyse, or diagnose, without the application of operative surgery, any illness of the body or mind by traditional methods" (Traditional Medical Practitioners Act, 1996, p. 264). This Act also provides that any person with knowledge and skills of traditional medicine can be vetted by

the council to be a registered traditional medical practitioner or registered spirit medium member of an enterprise. In this study, the community of healers, registered or non-registered are referred to as a healing enterprise (see Chapters Two and Six) but, according to the provisions of Traditional Medical Practitioner Act (1996), unregistered gainful practice is criminalised.

Both these Acts governing the operations of the healing enterprise contradicted the Witchcraft Suppression Act (1899) until its lifting in 2006. The Witchcraft Act (2006) concedes the practice of witchcraft and the existence of witches/wizards in Zimbabwean communities. This legal position resonates with the Tendera participants' and most indigenous Zimbabweans' beliefs that witchcraft causes illness. The Witchcraft Act (2006) acknowledges that witchcraft is a social and health destabiliser among Zimbabwean communities (Chavunduka, 2001). Today in Zimbabwe, witchcraft is a criminal offence liable to punishment such as imprisonment; however, since the inception of this law, no practitioners have been convicted. Such "offenders" have often been discharged on a lack of sufficient evidence or unstable mental status even if they confess to such criminal activities (Mawere, 2011). This arises from the fact that the western-oriented judiciary system, inherited by Zimbabwe from its colonisers, is not compatible with the indigenous knowledge of health and could not preside over such "offences". The judges themselves have been trained in a western-orientated system therefore they may not have adequate knowledge to deal with indigenous knowledge cases. Even the legal acts on traditional medicine are based on western systems that are not synchronised with indigenous knowledge systems.

Two provisions of this Traditional Medical Practitioner Act support this analysis. Firstly, the Act empowers the Minister of Health to be central to the operations of healing practices. Ironically, the Minister, being trained in western medicine, arrives at his/her judgment through western reasoning. Secondly, the Act, by commission or omission, fails to spell out the role of Chiefs and National spirits in the council. Such an approach cannot lead to the integration of traditional medicine into health practices. This built on the complexities inherent in following a research process that involves indigenous knowledge.

The Traditional Medical Practitioner Act (1996) authorises gainful traditional medical practices without further unpacking their definitions. In western and indigenous systems, "gainful" practices have different meanings. Within the western paradigms, which dominate issues of globalisation, technological advancement and international trends, the term implies material or monetary gains, that is, the commercialisation of the healing enterprise that

matches the manner in which western educated medical doctors trade their services. Within the indigenous perspective, the commercialisation of traditional healing or spirit-rooted wisdom is not African and therefore problematic. A village head of a Zimbabwean community (Frommer, 2003) expresses this as follows:

> [L]ong back, the whole thing of traditional medicine was not supposed to be commercialized … because of changing times it is happening … traditionally … is not appropriate … healing … not really come out of your own initiative … *masvikiro,* who do not really like to be commercialized.

In addition, by legalising the commercialisation of healing, the Zimbabwean government contradicts its constitutional obligation of recouping and sustaining its cultural practices, particularly that of medicine. As Dhewa (2008) rightly points out, gainful practices within indigenous healing in Zimbabwe are not defined in monetary terms but rather in symbolic capitalism. If executed in a proper cultural way, healing practices bring status to a practitioner and his family. As for materialistic gains, it is left to the assisted to give the practitioner tokens of appreciation. Nevertheless, the renewed interest in traditional medicine, particularly plant healing, by many people (individually, in groups or company representatives), is mostly rooted in economic gains (Òtúlàjà et al., 2011). Thus, practitioners are in a quandary whether to practise for symbolic capital or real financial gains. In view of the economic hardships that have persisted in Zimbabwe for about a decade, it is quite probable that some practitioners have registered with ZINATHA to protect their non-customary and bogus practices. Such practitioners often hold basic knowledge of IKoPH mainly acquired through learning from others (Dhewa, 2008). This underscores the importance of accessing authentic data from genuine indigenous healers (Mpofu, Mushayikwa, et al., 2014a). The problem is how this has to be done. This is a methodological question informed by the discussion in Chapter Four.

Health care in Zimbabwe is provided through public (government), non-profit, church (mission) and private organisations (Osika et al., 2010). This service is under the purview of the Ministry of Health and Child Welfare (Ministry of Health) whose operations are regulated within three main legal documents: (1) The Health Services Act (2002) regulates services provided by health centres (clinics and hospitals); (2) The Public Health Act (2002) standardises institutional (e.g. hotels, schools, colleges and including hospitals) health conditions; and (3) The practice of western-trained medical doctors is guided by the Health Practitioners' Act (2000). Both the Zimbabwe Health System Assessment (Osika et al., 2010) and the National Health Strategy (2009-2013) show that the Ministry of health considers traditional medicine as part of the overall health care provision of the country. The Tendera

community is serviced by two district hospitals, one government and a mission hospital in Chiweshe. Each of the village sites, Gomo and Deve, has one government clinic. Besides the hospital/clinic, western medicine based services there are community grounded traditional and Christian based medical services in the community of Tendera. This means that there are multiple health care delivery systems serving the Tendera community.

Three health service delivery categories are apparent from this discussion. These are: (1) the western, (2) indigenous, and (3) Christian. However, these seem to be unsynchronised as evidenced by their legislative Acts that are parallel to each other. To reinforce this argument, concern is raised about the status of the complementary medicine in Zimbabwe in the National Health Strategy report of 2009-2013 that says:

> In some … countries, traditional medicine has been integrated into the public health delivery system … receiving official attention and funding, with clear legislative and operational frameworks that ensure that traditional medicine is accessible and available ... In Africa, some research units in traditional medicine have been developed. In Zimbabwe, several institutions and individuals are carrying out research on traditional medicine … but this is individually driven, uncoordinated and lacks a national agenda (Ministry of Health and Child Welfare, 2009, p. 110).

There is no doubt that the health service system in Zimbabwe is varied and complex. The three health systems are guided by independent and unsynchronised legislature. This explicates findings in Mpofu et al. (2014a) that the Tendera participants demonstrated that they hold plant healing knowledge rooted in triple worldviews. Arguably, the choice of plants for healing rests with the consumers but government seems to be encouraging its populace to seek health services from the western paradigm-oriented mainstream sector. The little attention given to traditional medicine by the Ministry of health compounds the historical imbalances and complexities inherent in accessing this form of knowledge by the general populace. This includes unregistered healers who may be genuine and authentic custodians of IKoPH. These insights informed my methodology which I will elaborate in Chapters Four and Five. These choices are guided by insights obtained from the institutionalised education system that frames classroom science in Zimbabwe and, of particular interest to this study, Tendera community. The next section elaborates on the institutionalised education system.

3.5 Institutionalised Education

The colonial government and the missionaries introduced institutionalised education systems in Zimbabwe in an effort to do away with indigenous systems of education that existed and

evolved within the culture for centuries (see Kanyongo, 2005; Matsika, 2012; Shizha, 2005). Education at secondary and primary school levels is formalised in schools. In this section, I provide the institutionalised education context of this study under three themes. These are: (1) the structures of education; (2) science education reforms; and (3) classroom science curriculum.

3.5.1 The structures of Education

In colonial times, oppressive western education was used in two main ways. In one way, the British colonisers (settlers) used education as a tool for changing the culture of the colonised (indigenous Zimbabweans). Western education was geared towards corrupting the thinking and sensibilities of indigenous Africans (Matsika, 2012). Hence, it did not care about moulding African children into future responsible custodians of social, cultural and economic systems within their own societies (Shizha, 2005). In another sphere, it aimed at preparing children of the colonisers and those of the colonised for different predetermined roles in society (Shizha, 2006). The children of the colonisers had a separate education system that nurtured and groomed them to become employers. Their [African children] education system was aimed to provide a pool of labour. This clearly shows the racialised dual system of education that prevailed during the colonial period in Zimbabwe (Shizha, & Kariwo, 2011). There were two types of secondary education for Africans. One was the junior secondary education, referred to as the formal education system two (F2). The other was the senior secondary system of education, identified as the formal education system one (F1). The F2 system was a vocationally oriented system that was poorly planned (Dorsey, 1989). The products of this system (those who completed the program) were expected to become un/semi-skilled workers in low-skilled jobs (Shizha & Kariwo, 2011). In contrast, the F1 system was academically-oriented (in imitation of the British grammar schools) and considered to be superior to the F2 system (Shizha & Kariwo, 2011). It absorbed a very small proportion of African children from primary school level.

After gaining independence, Zimbabwe embarked on an unprecedented expansion of the education system. This was done to de-colonise and democratise the educational system in order to rid it of racial discrimination. The new government premised the education system on the philosophy of a free primary education, affordable secondary education and equal opportunities for all races. The ZANU PF manifesto legalised its goal of building a Zimbabwean and localised education system through the Zimbabwe Educational Act (1987). It can be argued that the agenda to indigenise Zimbabwe's education system was born with

independence in 1980 but, to date, has been modelled on the pre-independence British system (Makhurane, 2000; Maravanyika, 1990; Shizha, 2007). The institution of the Commission of Inquiry into Education and Technology (Nziramasanga commission) (Nziramasanga, 1999) and its recommendations endorse the rigidity of the Zimbabwean education system. So, I tend to agree with Maravanyika (1990) that, in qualitative terms, that is, transformative change, the education system is still very western. Maravanyika advances three reasons for this lack of qualitative educational reforms. Firstly, he argues that the new ZANU PF government lacked the economic stamina to effect socialist ideologically driven changes on the capitalistic based education system. His second reason is that policies of socio-cultural processes and educational plans were not synchronised. Thirdly, policy makers, themselves products of the western-oriented education system, are insufficiently equipped to implement the emancipating changes desired. In fact, change in itself is difficult to accomplish (Davis, 2003). No doubt, integrative classroom science reforms situated within a rigid system are even more difficult to accomplish. This explains the slow pace in attaining this endeavour in Zimbabwe.

Akin to pre-independence period, the government runs the country through ministries. The education system is under the purview of two ministries, namely, Ministry of Education and Higher Education. The F1 and F2 dual system of education has been collapsed into one F1 system. However, as it was during the colonial times, the education system follows a three hierarchical level pattern from primary through secondary to tertiary. The Ministry of Education governs the operations of the primary and secondary level while that of tertiary, science and technology falls under Ministry of Higher Education. The revised Zimbabwe Education Act (1996) mandates the Ministry of Education to provide the educational service from a legal position of children's fundamental rights without racial discrimination and prejudice. The Ministry of Education has subsidiaries that hold specific responsibilities. Two units that were established after independence that are relevant to this study are the Curriculum Development Unit and the Zimbabwe School Examination Council (ZIMSEC). This examination council was created to localise examinations from the British Cambridge system inherited from the colonial government. Ordinary and advanced examinations were localised in 1996 and 2000 respectively. However, this examination council serves only as the administrator, setting papers, marking and grading, while the contents of papers and the structure have remained rooted in the Cambridge system. I argue that the establishment of ZIMSEC qualifies the educational system in Zimbabwe as examination oriented. I demonstrate this in my discussion of the education structure in the next section.

Primary schooling from Grade 0 to 7 forms the first level of education. These eight years of primary school are in three tiers: (1) the Grade 0, the Early Childhood Development phase; (2) the Grades 1-2, the infant phase; (3) Grades 3-4, the junior phase; and (4) Grade 5-7, the senior primary phase. Children start grade one at the age of six to eight years. Learners' competences from grades one to seven are continuously assessed but, in principle, the transition from one grade to another is automatic. At the primary phase, failing does not prevent a learner from proceeding on to the next level. However, as Kanyongo (2005) points out, it is one determining factor, among others, of the type of school the learner enrols in for secondary schooling. The grade seven public examinations channel the learners into secondary schooling.

The secondary school is a six-year program consisting of three phases of two years each. The ZJC level forms the foundation phase of secondary schooling and is a transition stage from primary to secondary schooling. It consists of the first two post grade seven years. Each year of secondary learning is referred to as a form. So this ZJC level is made up of F1 and F2. Since the discontinuation of the ZJC national (public) examination at the end of F2 in 1999 (Secretary's Circular 4, 2004), continuous assessments through tests and school-based examinations has been used to determine pupils' interests and capabilities for their studies at subsequent levels (Matavire, Mpofu, & Maveneka, 2013).

The F3 and F4 are the next two years of the ordinary level phase of secondary education in Zimbabwe. Learners sit for the second public examination at the end of F4. There are three options for F4 leavers. The options mainly depend on individual performance in the public examinations. Firstly, leavers can discontinue formal schooling and either join the labour force or become unemployed. The majority of the ordinary level leavers fall into this category as it mostly caters to the failing group. In Zimbabwe, failing ordinary levels means not obtaining five passed subjects (Secretary's Circular 3, 2002). This is linked to the persistently high ordinary level failing rate over the year. For example, the pass rates from 2011-2013 ranges from 18.4 % to 20.72 % (ZIMSEC, 2014).

The passing group has two options: to enrol in colleges and other professional schools (e.g. polytechnic, agriculture, teaching, and nursing) or to proceed to advanced level studies. The advanced level, the third phase of secondary schooling, consists of another two years. These are the lower six and upper six, that is F5 and F6 respectively. Learners take a public examination at the end of upper six. It determines their entry into the universities in or outside the country. Those who fail to enter the universities can either join the labour force or

take up college studies. Education beyond second level in Zimbabwe forms the tertiary level that prepares students for the real world of employment and innovation. However, as the unemployment rate has been consistently high over the past decade, most of these school leavers join the world of the unemployed.

The primary and secondary schooling year structure is modelled on the colonial inherited British system. The schooling year is divided into a three academic terms that start in January and end in December. The three terms are separated by two school holidays (vacations) as shown in Table 3-2.

Table 3-2: Term and Vacation time in Zimbabwe

School activity	**Period**	
	Start	**End**
Term 1	Mid-January	First week of April
Vacation 1	First week of April	First week of May
Term 2	First week of May-	First week of August
Vacation 2	First week of August	First week of September
Term 3	First week of September	First week of December

The third vacation period falls between consecutive years, for example, from week one of December 2013, to the second week of January 2014. This contextual information was not only vital to me as the researcher for fieldwork planning purposes but also for providing the reader with a traceable research itinerary that can be audited.

The categorisation of primary and secondary schools in Zimbabwe has been inherited from the British colonial system. These categories originated from the Zimbabwe-Rhodesia Education Act (1979). The three main categories of schools are based on the responsible authorities. These are government, community and private schools. The Zimbabwe-Rhodesia Education Act (1979) was drawn up by the Zimbabwe-Rhodesia transitional government during colonial rule in Rhodesia and persists to the independent Zimbabwe. Ideally, it aimed at addressing the discriminations of the dual educational system existing in the country. However, as Shizha and Kariwo (2011) argue, the Zimbabwe-Rhodesia Education Act (1979) instigated a new twist that turned the African and Western dual education system into a three-tier system. This system classified schools into three groups, A, B and C based on the

resources[9] made available to them (Dorsey, 1989). In this study, I situate my study in two groups of government and parent-aided schools. So, money, materials and market fall into the parent resourced group, whilst the make-up and manpower form the government resource category.

As observed by Shizha and Kariwo (2011), the A, B and C school classification system did not eradicate the discriminatory practices or dilute them in the dual education system as desired, but rather maintained them in a new form. The A type classified schools were well resourced and served high-fee paying former white schools. These schools are located in upmarket urban areas in Zimbabwe where whites used to live. The Group B type schools were located in urban high density residential areas (townships) where Africans lived. Their school fees and resources were far lower relative to those for group A schools. The third category, Group C, contained poorly resourced schools in rural areas. These were non-fee-paying. Parents contributed to the education of their children through providing learning materials and supporting the development of the physical infrastructure.

In addition to discrimination of this school classification through resourcing, the then government put in place entrance or access laws. Firstly, entrance into these schools was strictly by zone, that is, a child would be admitted into a school that was within his or her area of residence. Secondly, entrance to a group A school was based on competence and proficiency in the English language, the language of instruction (Shizha, & Kariwo, 2011). These discriminatory educational practices continued from the colonial days. To address these disparities, the government of Zimbabwe, upon gaining independence, replaced the Zimbabwe-Rhodesia Education Act (1979) with the Zimbabwe Education Act (1987) which was further revised in 1996.

Today, the schools are still categorised in three major ways, with a slight variant from A, B, C models. The Zimbabwe Education Act (1996) collapsed theses three groups into Government and non-government schools. From this grouping, there are schools under the direct responsibility of the government, the G schools. While others, I call C schools, are under the responsibility of either urban or rural councils. Since councils are governed by the Ministry of Land Development, a government subsidiary, it follows that the government is also indirectly responsible for these schools. The non-government schools, I call P schools,

[9]The term resources embody materials (books, equipment, stationary, furniture, computers, buildings), manpower (teachers and ancillary staff), money (financial base), market (parental economic status, location and support groups), and make up (organisational structure).

are in the private (trustee and independent) schools group. These P schools are governed by Boards of Governors. Each school, regardless of category, can be either a boarding or day school, which, in turn, can be rural, urban, or peri-urban. In addition, P schools can be either mission or trustee run.

Drawing from my own experiences as a learner, parent, teacher, teacher educator and researcher, among others, the education system in Zimbabwean schools is not equally resourced. The P schools enrol white students and black students with upper class backgrounds. The C rural schools, where I have situated my research, contain only black African learnes and are heavily under resourced. Other school types occupy positions in the resource continuum from under to highly resourced.

In the preceding discussion, I have explained the underlying discriminatory practices inherent in pre and post independent Zimbabwe. It also shows efforts made by the new Zimbabwean government after 1979 to address these colonial inequalities in education provision through the enactment of legislative revisions. However, not much has changed from the pre-independence classification system of schools. It seems that the policies have just slipped into new politics of racism, separatism and social classification because the well-resourced schools are still today accessed by whites and black Zimbabweans who are financially sound. In addition, zoning in day schools is still practised, thus separating the poor in high-density locations from those in upmarket areas in their access to better-resourced schools. In a practical sense, the classification of schools has not shifted much from that of pre-colonial times.

3.5.2 Science Education Reforms

In Zimbabwe, science education is given a high priority. This is because science education is seen as setting the foundation for science and technology (Mpofu, Mushayikwa, et al., 2014b). In turn, science and technology are viewed as the main drivers of development (Shizha & Kariwo, 2011). As such, the Secretary's Policy 3 (2002), as read with Policy Circular 77 (2006b), compels all learners in forms one to four to learn at least one science subject.

Zimbabwe inherited laboratory-based colonial classroom practices. The expansion of education after independence increased the number of schools. The C rural secondary schools (referred to as "upper tops" in the eighties) mushroomed and more G rural day and boarding schools were built by the government. This colossal expansion of schools demanded more

teaching and learning resources, in particular, those related to classroom science. It constrained the available resources and threw the government into a resource quandary. The Zimbabwe Science (ZIMSCI) teaching was introduced in 1981 in an effort to solve this problem (Gatawa, 1998). This teaching program utilised locally and cheaply assembled resources that were distributed to schools in kits. Initially, ZIMSCI (science kit) teaching was designed for Junior Certificate level but was later extended to the ordinary level as the nation continued to struggle to provide resources. Notably, the science kit based teaching at ordinary level followed a Cambridge general and combined science syllabus. It was discontinued in the mid-nineties (Vhurumuku, Holtman, Kolsto, & Mikalsen, 2008) amidst several factors that included stakeholder resistance. I also contributed to rejecting this science kit based teaching, as, like many other teachers, I viewed it as inferior to laboratory resources I was exposed to as a high school learner and student teacher.

However, in reflecting back, I realise that the localisation of materials that this science kit teaching approach emphasised, encapsulates the principles of integrative classroom science that is situated in materials designed from indigenous or local resources. As far as I remember, teachers were neither consulted nor were they made aware about this reform, a factor which largely contributed to the abandonment of the science kit based teaching project. This is mainly because it was a hurried reform. Lessons drawn from reflections on the ZIMSCI project provide insights into who should participate in research that involves curriculum design at classroom level. Teachers, as critical agents of change, need therefore to be involved in researching phenomena relating to their practices in order to avoid resistance to reform initiatives, hence the participation of teachers in my study.

The introduction of the science kit based teaching project, and its subsequent abandonment, marked the beginning of several science curriculum reform initiatives in Zimbabwe. These reforms, however, as I show in this discussion, took the form of syllabi changes in terms of naming and coding rather than goals, content and pedagogical approaches. For example, the Junior Certificate level syllabus name changed from pre-independence general science to science in the post-independence Zimbabwe. In terms of the content taught and learnt, this remained as biology, chemistry and physics in one syllabus. Many syllabi changes took place at ordinary level. It started with the introduction of the “new” science curriculum in 1988, which was taught in two syllabi versions, named, the core and extended science. As it can be inferred from the name “core”, this syllabus version offered basic biology, chemistry and physics content around five themes (agriculture, community, industry, energy uses and mechanical systems) but were regarded as inadequately preparing learners for advanced level

studies in sciences. The extended syllabus offered more depth content. It was offered in parallel with combined science, physical science, biology, chemistry and physics as the Cambridge syllabus version. The rural C and G schools adopted this extended version with mission and trustee schools rejecting it in favour of Cambridge versions (Vhurumuku et al., 2008). As a result of rejecting this curriculum, the core and extended syllabi were replaced with new versions in 1996. As I have demonstrated earlier, these changes were mainly in naming and coding. "Core" became the integrated science but was considered inadequate to prepare learners for advanced level studies in science. Cambridge versions of natural sciences (e.g. physical science, physics with chemistry, biology, chemistry and physics) replaced the extended science version. To date, the science curriculum, despite being ZIMSEC based, has largely remained a colonial Cambridge epoch. As such, it qualifies to be defined as western-oriented, and is, therefore, not culturally relevant to the indigenous Zimbabwean learner.

It appears that the stakeholders rejected curriculum reforms that brought with them contextualisation aspects that favoured pre-independence positions at the expense of a deeper understanding of what children learn in schools. This substantiates scholars' (Makhurane, 2000; Nziramasanga, 1999; Vhurumuku et al., 2008) observations that science education in Zimbabwe is still not relevant to national and individual needs or goals. The setting up of the Commission of Inquiry into Education and Training in Zimbabwe (Nziramasanga, 1999) further reinforces the stakeholder concern about the lack of relevance of the broader education system to Zimbabwe. Today, this situation remains and Nziramasanga commission recommendations are yet to be transformed into reality (Mpofu, Mushayikwa, et al., 2014b). The inclusion of indigenous knowledge into science teaching is implied in the Nziramasanga commission (Nziramasanga, 1999) to teach cultural values as guided by the *Unhu* philosophy. Both cultural values and the philosophy of *Unhu* embody indigenous knowledge which, as I argued in Chapter Two, are culturally embodied and embodying. However, there are policy statements made in various government departments which advocate for the inclusion of indigenous knowledge into the school curriculum (see Cultural Policy, 2004; Science, Technology and Innovation, 2012). But it is worrisome that this reform, like many of the Nziramasanga commission recommendations, is yet to take off in Zimbabwean classrooms (Dziva et al., 2011) as it is obscured by multiple factors and complexities (Hewson & Ogunniyi, 2010; Nakata, 2007; Shizha, 2006, 2007). In the next section, I discuss the curriculum context of the classroom science in Zimbabwe.

3.5.3 Classroom science

As provided by the Zimbabwe Education Act (1996), the curricula for all schools are determined by the permanent secretary of the Ministry of Education. The secretary operationalises the practices of classroom science at all levels through curriculum documents. He or she draws from relevant documents of the State of Zimbabwe and other Ministries to formulate circular policies and develop syllabi. The science teacher's classroom practices are primarily informed by the syllabus, however, in order to legally provide learners with the government intended classroom science experiences, the science teacher is expected to read and interpret all curriculum documents generated at various levels of the Government. Such curriculum documents are inclusive of legislations, policies, reports and syllabi.

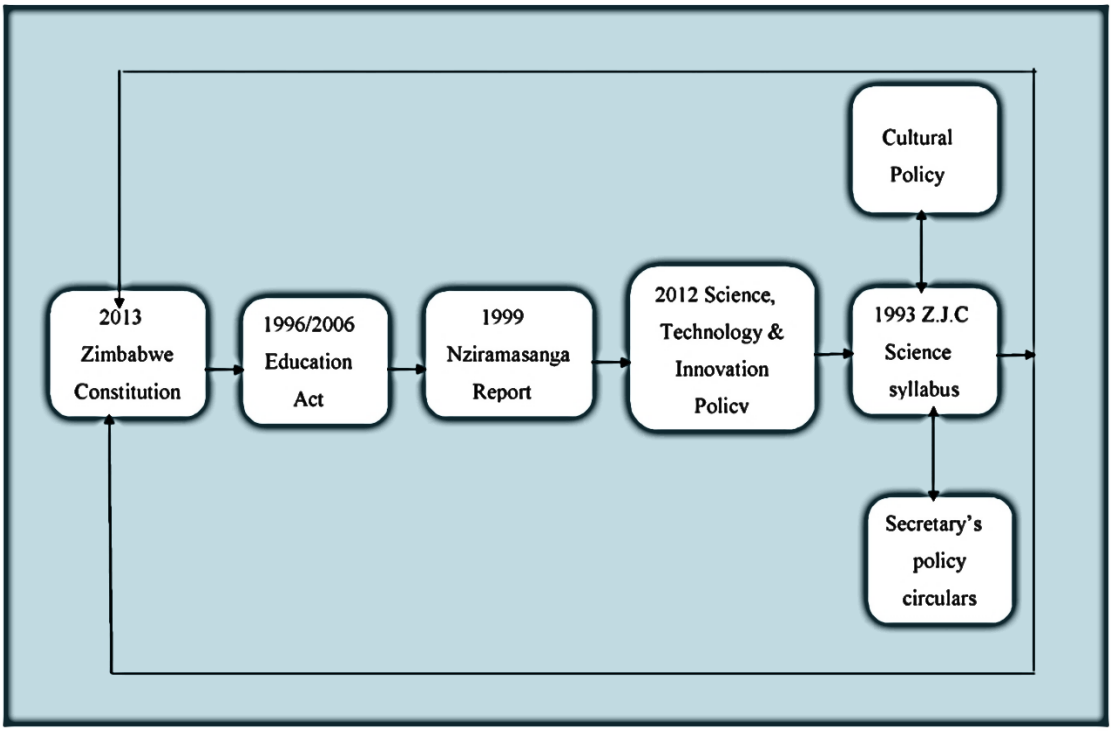


Figure 3-4: The science curriculum framework in relation Junior Certificate level

Figure 3-4 shows the links between the different curriculum documents into a classroom science curriculum frame at Junior Certificate level adapted from Mpofu, Mushayikwa, et al. (2014a). The arrow connects the curriculum documents and, from left to right, illustrates a three-levelled hierarchical document relationship. The Junior Certificate level science syllabus has been placed central to this curriculum framework because this study focusses on this educational level. However, the syllabus does not guide science classroom practices alone. Rather, it is informed and updated by other curriculum documents generated within Ministry of Education and across the government of Zimbabwe departments. In turn, it

informs the revisions or formulations of other documents like the Education Act. When new policies and legislatures are put into place, post syllabus launch, and there are amendments that revise the relevant syllabus sections, teachers at classroom level are expected to enact such revisions (Mpofu, Mushayikwa, et al., 2014b). For example, emerging findings in Chapter Seven show that the ZJC science syllabus (1993) in current use is not explicit about the teaching of indigenous knowledge in schools. However, teachers are directed to teach indigenous knowledge in the classroom through the provisions of the Constitution of Zimbabwe (2013), Science, Technology and Innovation policy in Zimbabwe (2012), and the Cultural Policy (2004) that were formulated after 1993.

Table 3-3 below shows the contents of the national ZJC science curriculum.

Table 3-3: The 1993 ZJC science syllabus table of contents

MINISTRY OF EDUCATION AND CULTURE **ZIMBABWE JUNIOR CERTIFICATE** **SCIENCE SYLLABUS**	
CONTENTS	**Page**
Preamble	2
Aims	2
General syllabus objectives	3
Methodology	4
Assessment Scheme	4
Unit A: Learning to be a scientist	5
Unit B: Energy and energy uses	8
Unit C: Plants and animals	10
Unit D: The particle nature of matter	12
Unit E: Resources and the environment	14
Unit F: Life processes	16
Unit G: Force and Action	18
Unit H: Reproduction	20
Unit I: Health	22
Unit J: Electricity	24
Appendix	26

This science syllabus is national, meaning that it instructs and guides (informs) classroom science at Junior Certificate level in all Zimbabwean secondary schools. Every teacher teaching science at this level in Zimbabwe has to interpret the syllabus and tailor it to his or her own classroom and school context.

As Table 3-3 above shows, the syllabus covers ten units, topics A to J. It is introduced by the preamble. The syllabus aims, general objectives, methodology and assessment guides are then outlined in that order. Each unit has a title from which its content focus can be inferred. The unit's purpose is outlined followed by the breakdown of topics, assessment objectives, content, notes and activities in relation to the sub topics (see Appendix G). The extent to which this government mandate cascades across curriculum documents in Figure 3-4 is the subject of Chapter Seven that discusses the finding of the curriculum analysis.

The secondary curricula in Zimbabwe are implemented by teachers at classroom level. In Zimbabwe, these teachers are either temporary ("relief" as they referred to in Zimbabwe) or permanent. The relief teachers are ordinary level and advanced level certificate holders occupying temporary teaching positions. The ordinary level holders teach in primary schools while the advanced level holders are deployed to teach in secondary schools. The permanent teachers are professionally qualified and have attended teacher training programs.

There are three ways of becoming a qualified teacher in Zimbabwe. The most common way is to attend teacher training at a teachers' college, two years for advanced level holders and three years for ordinary level holders. Another way is to go via a non-teaching college for three years and thereafter attain teaching qualifications after attending one year at designated universities. It is also possible to become a teacher after obtaining a teaching related degree and then studying for a one year post graduate diploma in education.

Notably, economic hardships in Zimbabwe have forced qualified mathematics and science teachers to go to neighbouring countries and abroad (Mpofu, Mushayikwa, et al., 2014b; Shizha & Kariwo, 2011). Currently, Zimbabwe is experiencing a serious shortage of qualified mathematics and science teachers, particularly in rural provinces, like Mashonaland Central. As highlighted during interviews with educators, the few qualified science and mathematics teachers remaining in the country transfer to urban schools.

In the next section, I discuss the context of the two schools nested in the Tendera community.

3.6 The Schooling Context

I did my fieldwork in the community of Tendera. I generated most of the data for this study in the two schools, the villages in which they are located and the surrounding villages. In Figure 3-5 below, I provide the reader with insights into the relative positions of these sub-communities (villages and schools) that constitute the community of Tendera. According to the nested field model I discussed in section 3.1 above (p. 79), these sub-communities are the micro-level context of this study nested in the macro-levels.

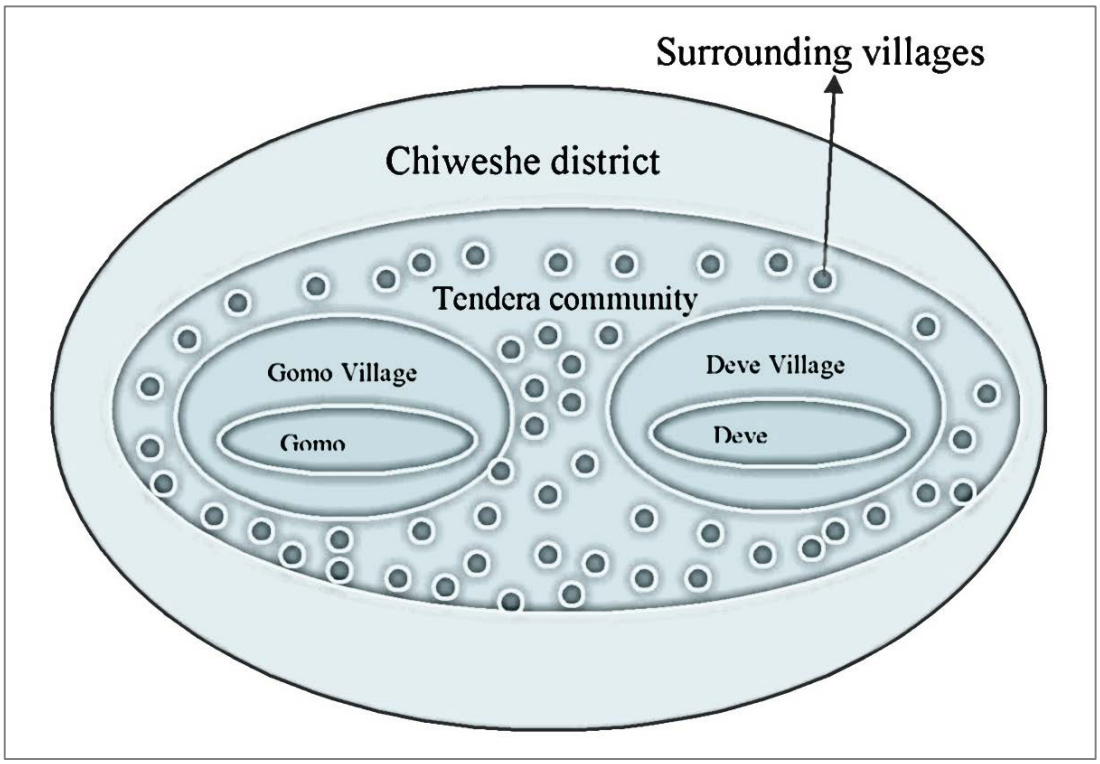


Figure 3-5: The two schools in Tendera community

It emerged that the identities (Tendera, Gomo and Deve) of these places are not common to all the residents of Tendera. They are also not registered with the Ministry of Land Development. They are neither pseudo nor unofficial. The naming of these places in this study was *kupetera*[10] instituted through the Elders' advice (see Chapter Four for elaboration). These names are cultural symbols within the community of Tendera rather than names merely used to hide the identity of the place. This naming process was necessitated by the incompatibility between the anonymity ethical standard requirement of the classical interpretive research and that of identity disclosure of the indigenous interpretive (Mpofu, Mushayikwa, et al., 2014a). I elaborate further on this in Chapter Five on fieldwork.

[10] A cultural protocol which I call spiritual infolding which started with the verbal and symbolic presentation of the issue. The response to the issue is authorization, acceptance, guidance and protection.

This tension provided me with two alternatives. One option was to work with registered healers in line with the provisions of the Traditional Medical Practitioner Act of 1996. This enabled me to disclose their identities in accordance with their expectations and as protected by their registered status. However, my taking of this route was at the risk of losing authentic data gleaned from the cautionary advice I got from Elders that many of the ZINATHA registered healers are bogus or hold superficial knowledge of plant healing (see Excerpt 8-12, p. 296). In addition, they told me that registering with ZINATHA was not in their culture and that the genuine healers traded latently. This reminded me of my father's unregistered but effective practices. Alternatively, I had to open participation up to both registered and non-registered healers in order to increase my likelihood of accessing genuine knowledge. However, this was problematic in that disclosure of their identities in line with their expectations meant exposing them as illegal practitioners who were liable to imprisonment according to the laws of Zimbabwe. At the same time, hiding their identities meant disregarding their wishes. These dilemmas evoked in me the question: Which alternative was ethical?

In order to progress in a fair and justifiable manner, I presented this dilemma to the Elders of the community and each participant in his or her individual and group settings. The Elders suggested using the pre-colonial period names. Interestingly, these names emerged to be the cultural and historical preserve of the Elders and were unknown to their children who participated in this study. Therefore, I had to seek approval for their use from all the participants. The following Excerpt 3-2 from one of my conversations with an eighty-three year old Village head in Deve exemplifies how this naming was informed by such sessions with the Elders of the land:

> **Excerpt 3-2:** I settled for culturally symbolic identities
> Deve is our clan identity. Our ancestors were the first settlers of this place. They named this place after its watery nature … you have done well asking me so … this name is great … it's like honouring our ancestors … I like it … Umm whites removed all our names and boundaries. Why did the government not bring back this …? Isn't it … like roads in Harare? (Appendix A-01, March 31, 2013, CT).

The school leader committee I established informed my selection of Gomo and Deve schools and their surrounding villages as study sites (see Figure 3-5 above). In the context of this study, this committee of leaders implies a committee made up of leaders from local communities who authorised my access to conduct this study at their local schools. It comprised members of the school administration (head, deputy head, senior master and

woman), head of headmen, headman of the village in which the school is located and the chairperson of the school development committee. The school development committee is a legally instituted school parent assembly to provide parental support for the education of their children at school level (Zimbabwe Education Act, 1996). It functions in three main ways: (a) to provide and assist the operation and development of the school; (b) to advance the moral, cultural, physical and intellectual welfare of pupils at the school; and (c) to promote the welfare of the school for the benefit of its present and future pupils, their parents, and its teachers (Section 4 of Statutory Instrument 87 of 1992). The school development committee, therefore, being a parent representative body, links the parents in community with their children's learning at schools. I selected Gomo and Deve schools after they had met all the four criteria of my self-developed schools selection, which are: (1) type of school; (2) relative location; (3) the school leadership committee consent; and (4) core participant availability. In the next section, I compare the context of these two schools in accordance with my selection criteria.

Gomo and Deve are both rural C secondary schools established by the government after independence. Both schools are day (non-residential), co-educational (enrol boys and girls) and single session. Being day schools means that children are given formal educational instruction during the day, after which they return to their homes. School sessioning in Zimbabwe refers to a set of classes that can be accommodated for learning in a school in a day. In single session school, one set of classes is accommodated per day, whilst the double session schools accommodate two sets, one in the mornings from 07:00-12:30 and in the afternoons from 12:30-17:00 hours. The school development committee levy resources these schools and these schools are also subsidised by the government. These government subsidies are provided in the form of annual grants and staffing[11] (teachers). Staffing is the process of recruiting, deploying, and retaining employees qualified to provide effective teaching services (Heneman, Judge, & Timothy, 2009). Teachers in these schools are therefore public servants. In both schools, classroom facilities are adequate, but there are no specialist rooms for reading, practical and science subjects. The laboratories for teaching and learning in the two schools were under construction at the time of the study. Both schools have electricity and borehole water facilities even though each one is close to a river. Classrooms for both

[11]Drawing from my experience as a head, in the context of the Ministry of Education in Zimbabwe, staffing refers to recruiting, transferring and deploying teachers according to the school teacher establishment. The staff establishment is the number of teachers per school by subject calculated on the minimum teaching load of teacher and the number of subject contact hours per week.

schools are used by different churches for services during weekends, except for the Apostolic religious sects who use natural spaces in the surrounding environment for worship.

Gomo is a high school whilst Deve is a secondary school. A high school in Zimbabwe means an institution offering formal education from junior certificate to advanced level, whilst a school providing formal education from junior to ordinary level is referred to as a secondary. According to the administrators from each school, they govern their schools through policies generated at district, provincial and ministerial levels. To this, Mr Chemu, the Head of Gomo secondary school, asserted: "Basically, I can just say all policies come from the ministry. These are then distributed to us through the provincial and district offices" (Appendix A-01, November 27, 2013, CI). This shows a top-down approach in policy formulation and implementation existing within the Ministry of Education. Thus, according to the administrators in these schools, the school-based curricula they are currently offering was informed by the Secretary's circular (2002) as read with Circular policy 77 (2006). Table 3-4 compares the curricula Gomo and Deve schools offer.

Table 3-4: Comparison of the curricula of both schools

Category	**Curriculum: Academic and non-academic**	
	Gomo school	**Deve school**
Languages	English Language, Shona	English Language, Shona
Humanities/social sciences	History, Geography, Bible knowledge/Religious studies	History, Geography, Bible knowledge/Religious studies
Sciences*	Science, Integrated science	Science , Integrated Science
Mathematics	Mathematics	Mathematics
Practical/business studies	Commerce, Fashion and Fabrics, Building Agriculture Accounts, Computers science	Commerce, Fashion and Fabrics, Agriculture
Cultural**	Drama, Traditional Dance, Scripture Union, science club	Traditional Dance, Art, Writing
Sporting**	Soccer, Athletics, Netball, Volleyball, Physical education	Soccer, Athletics, Netball
Life Orientation**	-	-

As Table 3-4 indicates, the curricula of the two schools were similar in many ways, but there

were differences that prompted me to inquire further into them as I considered this relevant to my study. For example, in the cultural category, Gomo offered scripture union and science club in addition to those offered by the two schools. When asked, Mr Dzawo, the head of School at Deve Secondary responded saying:

> **Excerpt 3-3:** Differences provided contextual connections
>
> Scripture union is a problem. I banned it to prevent unnecessary incidences … Like a year or two back I was involved in a serious problem from this praying business. Umm … it was really bad. A girl ran away from home where she stayed with her grandmother. In the gathering that she professed to have witchcraft demons cast on her by her grandmother … it was such a case. I really do not want to get involved again … To make matters worse is the lack of protection from the people above … they tend to side with the parents when such issues arise (Appendix A-01, November 27, CI).

As the above example shows, a curriculum difference provided me with insights into deep socio-religious issues that helped me to understand the actions and expressions of the participants, particularly the learners. With reference to the science club, he simply expressed concern that, as much as he would have loved the school to offer the club, it was constrained by a shortage of science teachers. There was no continuity as most science teachers used the school as a transition to urban schools. This was also the case with Gomo High, the difference being that the club was the learners' initiative. In fact, the district education officer, Mrs Hwata, even hinted to me that I was likely to face problems getting qualified teachers to be participants. She cited the same reasons of high staff turnover experienced by rural schools. The staff deployment statistics in the year 2013 confirms this position. Deve School had a teaching staff complement of seventeen teachers. Of these, only two (one qualified and the other a student teacher) were in a professional position to teach science. The department was boosted by teachers with related science qualifications such as geography. The same situation prevailed at Gomo. The staff compliment at Gomo was twenty-eight. Of these, three student science teachers and one qualified teacher taught science. They also were helped by, mostly, geography teachers. The differences in staff complements arise from the differences in the total enrolment of the schools. The enrolment of these two schools were 280 (127 female and 153 male) for Deve and 433 (184 female 249 male) for Gomo, respectively. In addition, 93 Gomo learners were doing advanced level studies. Such teacher deployment status informed my re-design of the teacher selection criteria as will be shown in section 5.2.2.1.

The two schools are located in Tendera community as shown in Figure 3-5. They are

separated by a distance of approximately 15 kilometres as calculated from my car mileage. They form part of the five secondary schools in Tendera community out of fourteen in the District of Mazowe. They intersect a catchment area in which they share some feeder primary[12] schools for form one enrolment. Deve also feeds Gomo with advanced level learners. Gomo, Deve, and the other eight secondary schools fall under the responsibility of the Mazowe (Chiweshe) Rural District Council. The remaining four schools include three boarding mission schools and one rural day Government School. So, my choice of rural day schools was based on the fact that they formed the majority of the schools in Chiweshe district. Deve and Gomo schools are both adjacent to a clinic, a primary school and a shopping centre. The availability of western health care services in Deve and Gomo villages showed me that the people of Tendera had three basic choices of health services. These are: (1) the western medical services provided through clinics; (2) the indigenous medical services with their community of Tendera; and (3) the complementary use of these two medical services. This information helped me to query the literature in terms of both cost and distance of clinics from communities as reasons for using indigenous medicine. This relative location context provided a suitable vicinity for the fair comparison of the IKoPH, classroom science and their integration that is the phenomenon under study within similar societal contexts.

Each school is located within a village and shares the name with the village as shown in Figure 3-5 above. Both the school and the village carry the family name of either the headman or the head of headmen. Children learning at these two schools do not only come from the village in which the school is located but from neighbouring villages as well. Gomo High School services nine villages whilst Deve Secondary School services eight villages. Consensus among the school leadership committee members to the use of data within their schools was a cohesive strategy of key people. I needed them to understand that the project was theirs by taking ownership and accepting me as a community member. Ownership of any aspect of life inculcates a sense of responsibility and accountability that brought with it the support I needed in terms of security, guidance and access. The early sessions with these committees enabled me to assess the potential of the community to provide my research with the participants (healers, teachers and learners). I later categorised these as core participants after realising the information rich base of these gate-keepers. I then defined those who opened the doors for me to the core participants as key as will be explained in Chapter Five on the fieldwork of this study.

[12] A feeder primary school is described in relation to Secondary school and they form one enrolment. It is one from which the secondary school enrols form one learners.

3.7 In conclusion

In this chapter, I have located my study in the nested contexts of Tendera, the education and health systems. This context points to the fact that, as a consequence of colonialism, Tendera people appear to manage their health from the triple worldviews of tradition, Christianity and western medicine. Furthermore, current policies within and across the Ministries (education, health, and lands) are uncoordinated within and across them resulting in contradictions and tensions. Moreover, science education reforms in Zimbabwe have been largely characterised by failure, and, as such, are still modelled on pre-independence systems. Within the health sector, despite the legal recognition of traditional medicine as a valuable health care system for many Zimbabweans, there seems to be no stakeholder collective initiatives to complement it with the existing western medicine system. The chapter has shown that these contextual elements interact within the Tendera community and across the macro-level (district, province, nation and the world at large) into multifaceted and complex systems. This situation sufficiently informs us, the researcher and the readers, that this study is situated in a complex societal structure that further deepens the complexities embedded in this study. The complexities of the phenomenon under study situated in a complex context informed my development of the methodology that guided me in negotiating boundaries between my own world and the study problem rooted in the Tendera community. This condition, revealed during my fieldwork, informed my re-examining and re-adjusting of methodological approaches from those I had earlier proposed to suit the emerging context. In the next Chapter Four, I discuss the methodology used in this study.

4 CHAPTER FOUR: AN INDIGENOUS AFRICAN INTERPRETIVE METHODOLOGY

Chara chimwe hachitswanyi inda (One person cannot do all things alone) (Shizha, 2009, p. 139)

4.0 Introduction

Methodology is the "theory of knowledge and the interpretive framework guiding a particular research project" (Harding, 1987, p. 2). It is grounded in a paradigm that governs its implementation. The knowledge world is not a preserve of a single discourse, method, theory or paradigm (Aikenhead & Ogawa, 2007; Richardson, 1991). This makes the study of phenomena possible through many methodologies as the African proverb cited above espouses. Methodology simply implies the theories behind method (Kovach, 2010a; Le Grange, 2009). To date, different methodologies drawn from different research paradigms including quantitative, qualitative, and indigenous have been used in science education research. For this study, I used a self-developed Indigenous African Interpretive (IAI) methodology to explore the integration of indigenous knowledge and western science at classroom level. The use of this methodology catered for the different worldviews of the different knowledge forms that made up the integration phenomenon under study (Mpofu et al., 2014a). However, my extensive review on science education literature for western and indigenous research methodologies did not reveal any possible combination of the two in Zimbabwe. This left me with no choice but to develop this IAI methodology.

This chapter discusses this IAI methodology used in pursuit of the methodology objective of this study I set in Chapter One (see section 1.4, p. 11). It begins with a brief examination of the paradigms and methodologies used in previous studies on or related to integrative classroom science conducted in Africa and elsewhere. Significantly, this review shows methodological gaps existing in African studies on indigenous knowledge and science education that were filled in by this IAI methodology. This is followed by a discussion on the development of this IAI methodology, which starts with its location in an interpretive bricolage paradigm. It then discusses, in turn, the western qualitative and indigenous research components whose synthesis resulted in this IAI methodology.

The focus of this chapter on the methodology separates the methodology from the methods used to generate data. I did this being aware that, in practice, as Le Grange (2009) points out, methodology and methods are inextricably interwoven. However, this separation, that is the

discussion of the methodology in this chapter and that of the methods it informs in Chapter Five, is important for analytical and organisation purposes.

4.1 Paradigmatic and methodological praxes

As discussed in Chapter Two, after independence, most African governments formulated educational policies aimed at redressing colonial curriculum irrelevancies and imbalances. They prioritised the inclusion of indigenous knowledge into the school curriculum – a reform movement that was also being undertaken by other nations (e.g. America, New Zealand, and Canada). In consequence, several researches in such nations have been and are being conducted to provide academic support to these integrative curriculum reforms. Notably, the researches have adopted a variety of paradigms and methodologies, which is my focus of discussion in this section. This is in line with my literature review standpoint presented in Chapter Two (see section 2.1, p. 22).

Woolman (2001) conducted a comparative analysis on the inclusion of African culture, history and language in the curriculum in Kenya, Mali, Mozambique and Nigeria. Informed by the theory of post-colonialism, the study document analysed the extent to which decolonisation and re-integration of indigenous African educational values and social organisation was effected in these four African nations' post- independence school programs. The study revealed that, in all these nations, attempts to indigenise the education system were futile. Furthermore, Woolman asserts that schooling across these nations was characterised by low completion rates, high-grade repetition and high dropout rates. He conceded that these are good pointers towards the lack of relevancy of African nations' curricula. The study recommended that the development of indigenised curricula be informed by a re-constructionist lens because the products of such school curricula need to adapt to contemporary life. Contemporary life in African communities and elsewhere is shaped by both indigenous and western worldviews as discussed in section 2.3.4 on worldviews (pp. 38-44). The double visioning children integrative objective is therefore being reinforced (see 2.5.3, p. 68).

In Kenya, major studies in indigenous knowledge and the school curriculum have mainly used methodologies grounded in western qualitative paradigms. For example, Bunyi (1999) mixed historical and ethnographical approaches to advance the inclusion of indigenous African languages in African systems of education. Though not explicitly stated, it can be drawn from her arguments that this qualitative research was informed by theory of post-colonialism. In another Kenyan study, Owuor (2007), examines educational documents

inclusive of the Ndegwa Report of 1971 and the Ominde Report of 1964 and established that the government of Kenya had, for a long time, put in place an agenda of integrating indigenous knowledge into school curricula. She revealed that the effective implementation of this reform in Kenyan schools, like in many other African countries, was militated by many challenges. Examination of the curriculum and hierarchical and unified structure of the education system, were revealed to be contra to indigenous systems of education. She also identified similar challenges to integration that were discussed in section 2.5.2 (p. 66). Such studies point to the need to decolonise, not only the school curricula, but also to first decolonise the minds of the policy makers in order for them to create systems of education that are supportive of the inclusion of indigenous knowledge in the school curricula.

For over fifteen years, the science and IKS projects in South Africa, that are discussed in section 2.5.6 (p. 75-78), sought to pedagogically capacitate teachers for integrative classroom practices. Many studies conducted within this project were informed by Ogunniyi's (2007) CAT that he modelled from the Toulmin's (1958) Argumentation Patterns. Using this Contiguity Argumentation theory or its variances, several studies situated in this project employed qualitative methodologies such as case studies, dialogues and discussion. A similar study, the rekindling traditions project, was conducted in Canada through the collaboration of Aikenhead and six science teachers (see section 2.5.6, p. 77-79). This study used a Research and Development approach to develop curriculum materials and instruction practices for the classroom. Its origins are traceable to scientific inquiries used in natural sciences (Aikenhead, 2002). Notably, similar to Woolman's study discussed in this section above is rooted in the western templates of researching.

My in-depth literature review led me to the conclusion that, in Zimbabwe, major studies in the area of indigenous knowledge and classroom science are scarce, if not negligible. However, small scale research done in this area, like in many other Africa nations, has mostly used western qualitative approaches (see Dziva, et al., 2011, Kazembe, 2010; Kazembe & Mashoko, 2008; Mashoko, 2014). Such studies are silent on the theoretical frameworks that informed them. The one major PhD study I came across done by Shizha (2007) to obtain rural primary school teachers' insights into problems encountered in incorporating indigenous knowledge into the science curriculum also adopted a qualitative approach. All these studies give insights into how Zimbabwe and other African nations are lagging behind in the indigenous knowledge and the school curriculum decolonisation agenda.

The development of the *i*SPACES[13] instructional model is yet another example of an African project that sought to provide solutions to the integrative classrooms science problems in Tanzania. In this study, Semali and Mehta (2012) adopted a case study approach that triangulated data from interviews, classroom observations, document analysis and a survey questionnaire to examine challenges and responses to science education reforms. They recommended the iSPACES instruction model as being suitable for integrated classroom science practices. What I found in this study to be most informing and relevant to my study was its authors' acknowledgement that

> this study has discernible methodological limitations, but we realize [that] no one method, including Participatory Action Research, can capture the reality of the local situation, represent the development problems, or chronicle the feelings and passion of individuals committed to improving lives and well-being in local communities (Semali & Mehta, 2012, p. 238).

The major methodological limitation pointed to here is the use of western theories or paradigms in research that explored indigenous knowledge phenomena. Even Participatory Action Research is grounded in western qualitative approaches to research. An unfair assumption that can be drawn from such use of western oriented research approaches in researching indigenous matters is that indigenous knowledge systems are short of paradigms and methodologies academically fit for doing valuable, credible or acceptable research in the western research dominated academy. This is against the proponents of anti-colonialism who argue for the use of indigenous frames of research for the total decolonisation of indigenous people, their knowledge and communities (see section 2.2, p.2623). Arguing specifically for the African case, Owusu-Ansah and Mji (2013, p. 1) emphasised that "[i]n the predominantly [w]estern-oriented academic circles and investigations, the African voice is either sidelined or suppressed because indigenous knowledge and methods are often ignored or not taken seriously". This explains the mushrooming of different indigenous methodologies researchers, particularly those with an indigenous cultural background, have applied in different nations outside Africa in recent decades, for example, Tahltan (Thompson, 2008), sharing circle (Lavallee, 2009), conversation method (Kovach, 2010a, 2010b) and Kaupapa Maori (Bishop, 2005). Notably, the development and implementation of these indigenous methodologies largely followed the popular publication, *Decolonizing methodologies, research and indigenous peoples* by Linda Smith (1999).

[13] iSPACES stands for Innovation, Science, Practicals, Application, Conceptualization,Entrepreneurship and Systems.

Post-colonial theories accommodate doing research with indigenous people, on their knowledge within their localities through western-grounded research paradigms and methodologies (see Dei, 2000). But the question this raises is whether the power of such research approaches is able to decolonise minds, cultures and knowledges that have been deeply marginalised by western thoughts in the academy and in ways of life in general for many years. It can be argued that their single use potentially perpetuates the dominance of western research approaches in the world of knowledge production at the expense of liberating and legitimising the indigenous thought systems. But where documented indigenous research frames, particularly within Africa local contexts, are limited, it may be justifiable to use these well-developed western qualitative approaches. These can be viewed as inevitable in unravelling the little known African paradigms and methodologies. The approaches can then be mixed in complementary ways with research on phenomena that involve indigenous people, their knowledge and cultures in their communities – an approach that Dei (2011) advocates. In fact, some studies such as Lowan (2012), and Martin and Mirraboopa (2009), have successfully documented indigenous frames of research in their contexts through this indigenous and western qualitative study mix. Even those that I have discussed in the previous paragraph tended to blend with the grounded theory, which is a western qualitative research approach.

The above discussion provided me with, not only direction in my development and use of this IAI methodology, but also with justifiable grounds for its use. In the next section, I discuss the interpretive bricolage paradigm in which I situated this IAI methodology.

4.2 Interpretivism bricolage

Western qualitative and indigenous research share many similarities (Dei, 2011; Lowan, 2011, 2012a). Both are context specific and interpretive. Indigenous people study nature through interaction with its elements on a day-to-day basis (Barnhardt & Kawagley, 2005). In so doing, they generate qualitative data that they archive in non-written formats (Aikenhead & Ogawa, 2007). Western trained researchers enter into communities, including indigenous, to do qualitative research (Denzin & Lincoln, 2005). Like indigenous people, western researchers also generate qualitative data but store it in written, image and video/audio formats. If indigenous researches are qualitative and interpretive what then differentiates them from western qualitative research? Kovach (2010, p. 40) responds to this question by saying:

> What makes indigenous research distinctive is not its methods, but rather its presuppositions (paradigms) and their interplay (relationships) with the methods, as well as the extent to which the methods are congruent with these presuppositions.

The recognition that western qualitative and indigenous research are both interpretive but differ in their paradigms, led me to locate this IAI methodology in bricolage interpretivism. Figure 4-1 below visualises this research paradigm in a holistic picture.

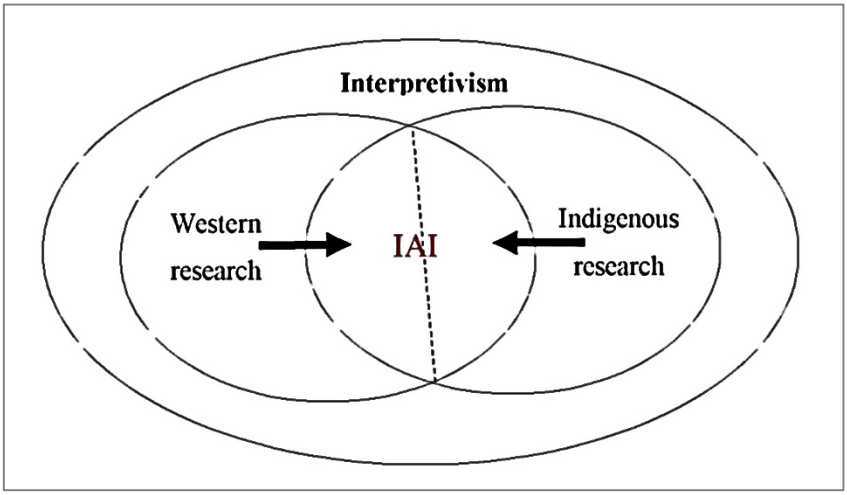


Figure 4-1: The IAI location in the interpretive paradigm

The larger circle symbolises the interpretivism paradigmatic position of this study. This IAI methodology is interpretive because it presumes that interpretation is central to discovering meaning situated in qualitative data. It is generally accepted that, within interpretivism, reality is a construct of the human mind (Cohen, Manion, & Morrison, 2011). Hence, interpretation describes an attempt to make sense of phenomena in terms of the meanings people bring to them in their natural settings (Denzin & Lincoln, 2012). The difference between western and indigenous research based interpretation is in their worldview lenses. For example, wherein indigenous research accommodates intuitive (dreams) based interpretations, the western researcher relies on his or her human analytical mind. Such differences form the basis of the argument advanced by indigenous scholars, such as Linda Smith (1999), Kovach (2010a) and Lowan (2012b), that it is culturally insensitive to investigate phenomena which involve indigenous communities and their knowledge from a western research perspective. Due to paradigmatic differences, some aspects of indigenous communities are not amenable to the western methodologies of research. Such approaches can result in misinterpretations and misrepresentations of indigenous knowledge. The same argument frames the use of indigenous research to study western science defined phenomena, for example, western oriented classroom science.

The inner circle labelled “western research” depicts the interpretive category of western research (qualitative), not western quantitative or mixed (quantitative and qualitative) approaches. The other circles labelled “indigenous research” represent indigenous inquiries. The intersection space of these two research approaches connotes this IAI methodology. It is the product of bricolaging theories, methods and ethical protocols from the western and indigenous interpretive paradigms. Bricolaging research approaches are adopted where phenomena and contexts are recognised as complex (Denzin & Lincoln, 2012; Kincheloe & Berry, 2004; Rogers, 2012). I situated myself in the intersection. The IAI methodology in this space called for the role of an interpretive bricoleur. As Denzin and Lincoln (2012, p. 11) say, in this role, I engaged in “an interactive research process that was shaped by my own personal history, gender, social class, race, ethnicity and those of the people in the setting”.

The broken arrow in Figure 4-1 above visualises IAI methodology as a two-part research approach. The arrows illustrate the first level of bricolage. This involved deciding on and drawing western and indigenous research aspects appropriate to this study from a family of each research approach. However, the non-availability of indigenous research relating to the Tendera community paradigm required me to get its methodology from the participants. I incorporated the aspects of this methodology as they emerged during the course of the fieldwork. In the second level bricolaging, I drew aspects from each compartment as and when the fieldwork situation determined. These included negotiating for participation and access, generating data, analysing and interpreting data.

To construct this IAI methodology, I drew lessons from indigenous researches such as Lowan (2012b) and Martin and Mirraboopa (2003) who self-developed similar, bricolage research. Lowan (2012b) describes his methodology as a métissage, a mix or blend of western research and indigenous aspects into an inseparable whole. He shares the source of his bricolaging as:

> I drew upon a diversity of cultural and academic sources, including western and indigenous theorists, historians, scientists, and educators, and interpretive qualitative researchers from around the world to construct this methodology” (Lowan, 2012b, p. 116).

His methodological synthesis approach resonates with the synergistic approach suggested by Barnhardt and Kawagley (2005). This differs from Martin and Mirraboopa’s (2003) indigenist research framework that was constructed through aligning Aboriginal ways of knowing, being and doing with western qualitative research frameworks. This is landscaping indigenous research on western research approaches advocated by Dei (2011) and Kovach

(2010a). The reason for using such an approach is mainly due to the scarcity of literature on local indigenous communities. The IAI methodological approach I suggested in my proposal aligns with the synergistic approach. However, data and further review of literature necessitated the use of a landscape version of mixing western and indigenous approaches. I drew relevant aspects of indigenous research from the community and from western research from the literature. These, in the IAI frame, existed side-by-side. Changing focus in research that is qualitative is not unusual but can be expected due to its emergent and open-ended nature (see Bogdan & Biklen, 2007; Denzin & Lincoln, 2012; Patton, 2002). The IAI extends the boundaries of western research to include indigenous research aspects which traditionally fall outside the zone of the western research approaches (Mpofu, Mushayikwa, et al., 2014a). The western interpretive component of this IAI methodology is discussed in the ensuing section.

4.3 The western qualitative research frame

Qualitative research is an umbrella term under which a variety of research approaches that emerged from this paradigm is clustered. The research approaches in this family share some characteristics. These characteristics are revealed in its many definitions provided in the literature. I draw on the qualitative definition of Denzin and Lincoln (1994, 2005) to highlight the general characteristics of qualitative research that I found relevant to this study. I selected these two definitions because they concur with the tenets of qualitative research that other prominent qualitative research methodology scholars, such as Bogdan and Biklen (2007) recommend. Denzin and Lincoln (1994, p. 2) explain that western qualitative research is "multi-method in focus, involving an interpretive, naturalistic approach to its subject matter". These authors also provide the following definition:

> Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that makes the world visible. These practices transform the world. They turn the world into series of representations, including fieldnotes, interviews, conversations, photographs and memos to the self … involves an interpretive, naturalistic to the world … study things in natural settings, attempting to make sense of or interpret, phenomenon in terms of the meanings people bring to them (Denzin & Lincoln, 2005, p. 3).

By examining these definitions, I arrived at six main features of qualitative research that I regarded as most important for this study. In the first instance, is the situating the researcher in the world description of this approach. This suggests the need for an in-depth

understanding of the studied phenomenon not only in terms of its locale, but also in terms of its theoretical world. The Tendera community discussed in Chapter Three provides the location world of this study. The classroom science is basically located in the school world and IKoPH in the community of Tendera or the home world. Secondly, its description as a multi-methods approach created for me opportunities to bricolage methods, protocols and theories and study the integration phenomenon from different angles. Doing this provided me with an in-depth and holistic understanding of a complex problem. Thirdly, qualitative research as naturalistic demanded that I locate the study of this integration phenomenon involving knowledge of the indigenous people, within their community. This community location enabled me to study the phenomenon within the indigenous holders' natural setting (their community world). Fourthly, emic qualitative research directed me to pay close attention to learning the meanings that the Tendera participants gave to the IKoPH and its integration into classroom science. This is supported by Corbin & Strauss (2008, p. 16) who say that doing qualitative research means going "past the known and to see the world with the eyes of participants". Fifthly, as a tool for making the world visible, the qualitative research approach enabled me to explore ways of revealing secret aspects of IKoPH, document it and illustrate how to make it visible in classroom science in Zimbabwe. So, the adoption of this approach serves to extent this visibility function. Sixth and last is the interpretive feature, which I have already described in the previous section.

The western qualitative research frame I used comprised aspects I drew from community-based participation, ethnomethodology and complexity theory. Each contributed through its unique focus and together these approaches culminated in the western research framework for this study.

4.3.1 Community-based participatory research

Community-based participatory research (CBPR) is a western framed collaborative research approach used in doing research with non-western populations, the indigenous people (Castleden, & Garvin, 2008 p. 1395). It is one of the many participatory approaches to research. Others include action research and transformative research participation. As a research approach, CBPR is both a philosophy and a methodology (Fisher, & Ball, 2003). In this study, I used some of its unique methodological tenets that separate it from participatory and qualitative research approaches. This approach underscores the importance of upholding ethical protocols of "consent" and feedback to the community (Castellano, 2004). In addition, it characterises the indigenous people involved in research as equal partners. As a western

rooted approach, it upholds these ethical issues of consent, feedback and equal partnership from the western research perspective. This provided me with an ethical frame for gaining access into western defined contexts of this research, such as the Ministry of Education.

However, such research frameworks were not adequate for access negotiations to the Tendera community and IKoPH. For instance, wherein western qualitative research demands written consent, the consent in Tendera community is verbal and cultural involving spiritual clearances, acceptance, protection and guidance (Mpofu, et al., 2014a).

Equal partnership in CBPR implies knowledge and experiences appropriation between the researcher and participant, their joint responsibilities and community capacitation (Minkler & Wallerstein, 2003). My adoption of this approach meant pursuing three overarching goals cited by Castleden and Garvin (2008) as: power, trust and ownership that are intrinsically related to each other. This initially provided me with a general value frame from which to inform the shaping of our (the people of Tendera who participated in this study research team and myself) behaviours during our interactions. Castleden and Garvin (2008) provide the conceptualisation of these terms (power, trust and ownership) that informed our data generation, analysis and interpretation as well as reporting in this study at the commencement of the study. Some terms were modified in accordance with their meanings as expressed by the Tendera participants. Balancing research power implies sharing the research control of the processes and outcome. Partnering with indigenous people in research means their active and visible authority in the construction and implementation of the research initiatives (Harrison, 2001). This research, being instituted for a PhD qualification, differentiated me from my participants in terms of western educational levels and national roles in Zimbabwe. It also meant the involvement of the Tendera community started from the stage of the fieldwork rather than from the proposal stage. This injected power imbalances in contradiction to the principles of equal partnership. However, I used such tension and imbalances as the basis to develop trust among us as advised by Castleden and Garvin (2008). This was to be informed by what the participants described as “power balancing” which allowed me initially to frame my research within co-participation and co-researching. Together, we formed a research team. Trust development does not only begin with efforts of sharing power among the members of the research team, but also with sharing the benefits of the study. While the benefit to the researcher is learning that leads to a doctoral qualification, the participants’ benefit, from their perspective, is not defined. Trust is a human value that is built through openness and honesty; values that are common to western scientific and indigenous worldviews (see Figure 2-3). Further, Castleden and Garvin (2008) assert that

research ownership comes with sharing decision-making with the progression of the process. This sharing of decisions related to the project comes through dialogic interactions that create opportunities to talk with each other (Matsika, 2012). This resonates with oral means of communications within indigenous communities where local people engage and have engaged over generations in community cultural meetings, known in Shona as *matare* (Shizha, 2009). This principle of community research informed my decision to utilise existing group settings in the community of Tendera, such as the Tendera Chief Council, and the School Leadership Committee. The composition and functions of these groups are discussed in Chapters Three and Five.

Some recent studies involving indigenous people in rural communities from which I drew lessons included Keane (2005), Thompson (2008), Malcolm, Gopal, Keane, and Kyle (2009), Stace (2011) and Khupe (2014). These studies all demonstrate the power of participatory research approaches in understanding the indigenous knowledge from the indigenous people. Keane (2005) and Khupe (2014) both used transformative research participation in the studies conducted in rural Zulu communities of South Africa. The participatory approach emphasises participation for transformation. The focus of the participatory aspect of the IAI is not transformation, but on values of reciprocation or mutual long-term benefits and relationships that arise from interactions and exchanges of ideas.

4.3.2 Ethnomethodology

Ethnomethodology focuses on the day-to-day methods used by community people to create meaning or knowledge in their social settings (Garfinkel, 1967; Macbeth, 2010). For this reason, I incorporated it into the western research component of the IAI methodology in order to guide me in establishing the Tendera methodology and worldview which I found to be limited in the literature. Ethnomethodologists argue that "cultural members are the first methodologists on the research scene" (Macbeth, 2010, p. 393). Community people, like the people of Tendera who participated in this study, are social researchers in their own right. They "use their own naturally occurring common sense knowledge to make sense of a chaotic world" (Payne & Payne, 2004, p. 77). In understanding the world, this ethnomethodological approach proceeds with no fixed set of data generation methods, but rather proposes the use of methods satisfactory to the understanding of the phenomenon under study (Dowling, 2007). Ethnomethodology challenges the "presumptive authority of formal methodology [that] an inquiry could not be credible unless its methods were regular, repeatable and vetted in advance" (Macbeth, 2010, p. 393). Together, these ethnomethodological approaches

provided me with a flexible research framework that enabled me to use many methods, including the emerging, though little was known about them.

To the ethnomethodologist, language meanings are dependent on their contexts, therefore they are indexical (Garfinkel, 1967; Macbeth, 2010). This means that a conversation describes an interaction as well as represents or indexes (hence indexical) some meaningful features of the social situation in which it is taking place (Attewell, 1974). “Talk and listening are analytical tools” (Macbeth, 2010, p. 392) that underlie indexical analysis but are not limited to language, but also apply to action. As an analytic function, indexicality focussed me on expression and/or action to index or classify the methodological meanings. For example, the expression *iropa* (it is blood) which participants recurrently uttered during conversation could mean a genetic inheritance, cultural identity, an inquiry, a realisation, a talent, an ancestry origin, destiny or fate and so on depending on the social context in which it is used.

4.3.3 Complexity theory

Within the complexity theory, I defined my fieldwork as a learning phenomenon, therefore, a complex system. My fieldwork involved six main interrelated aspects or activities that explains my description of it as a complex system. These included (1) negotiating for participation (2) negotiating access (3) data generation (4) data analysis and its interpretation (5) reporting of findings and (6) review of literature. My incorporation of chaos theory characterised my fieldwork schedules within the complex theory frame proposed by Clarke and Collins (2007).

Capra (2002) defines a complex system as a whole composed of interconnected parts that nonlinearly interact. Accordingly, complex systems display a network pattern, have feedback loops, are self-regulatory, can be in disequilibrium and are nested, making them dynamic (Clarke & Collins, 2007). In turn, dynamism makes interactive patterns of this system difficult to predict. The above five components of a complex system ariticulated by Clarke and Collins shaped the way my fieldwork progressed. The fieldwork complexity was induced by the complex nature of accessing IKoPH from its holders in Tendera community.

A network structure relates to the splitting of a point into numerous but joined aspects. The nonlinearity of a complex system stems from this networking. This demanded that my fieldwork activities progressed as a whole rather than in sequential stages. The six fieldwork activities I have identified above took place simultaneous and continuously. It involved many

people from the time of entering the field to the time of exiting it. Indigenous approaches to gaining access (further elaborated in Chapter Five) demanded my interaction with many people in their individual capacities and in group settings and at different community levels relevant to the community of Tendera. In Chapter Three, I demonstrated that Tendera community, the location of this study, is nested within other contexts including the district of Chiweshe, Mashonaland Central Province and the nation of Zimbabwe. This situated my fieldwork at many levels. The research activities I have listed above commenced from National level through the province and district and intensified within the Tendera community including in homes, schools and classrooms. Inherent in these contextual levels is a hierarchical structure that was induced by the western ethical protocols of getting authority to conduct research. The IKoPH knowledge aspects generated fieldwork practices in many directions and levels that could be characterised as chaotic.

The complex system feature of feedback loops stems from its nonlinearity that makes each point (dimension) convergent with other elements. Such points are described as feedback loops in relation to how information moves within the complex system and/or the possibility of understanding it from several angles. Hence, feedback loops are multiple points or locations from which control and organisation, order and direction stem (Clarke & Collins, 2007). These create "spaces for new directions, sudden changes, and alternative ideas to be taken up and engaged in" (Clarke & Collins, 2007, p. 167). During my fieldwork, this feedback process induced surprising, infrequent and unforeseen events. I changed my plans in response to new things (decisions, observations and ideas). This explains why my fieldwork changed character to proceed with both planned and impromptu activities as will be shown in Chapter Five. This called for patience and faith as some of the activities could not be immediately linked to the problem under study, but would be illuminated in subsequent events.

The self-regulatory feature of complex systems describes their changing features in response to changes made at local level (Clarke & Collins, 2007). These changes take place naturally without authorities guiding policies. According to these authors, the environments in which groups of people freely interact culminate into fruitful outcomes. Johnson (2001) describes these outcomes as critical points, patterns or emergences which arise from supportive environments. I linked this feature to the creation of environments for community based participation that encouraged respectful relationships, openness, shared responsibilities and accountabilities of the study process and its outcome.

The disequilibrium feature of complex systems means that they can be imbalanced or destabilised resulting in chaos and uncertainty. Their dynamism makes them sensitive and responsive to changes that can cause instability. To restore equilibrium, complex systems take up alternatives and reorganise themselves. Clarke and Collins (2007, p. 164) argue that chaos is a "source of spontaneity, creativity, and growth optimum conditions". In other words, chaos leads to orderly patterns. I linked this feature to self-regulation that took into account unplanned and spontaneous events by directing my fieldwork from both my contributions and the contributions of my participants. So, throughout each day I spent in Tendera community, I spliced and blended my intended activities with those suggested by the participants or with observed occurrences. For example, conversation session in the sacred cave of Shati community with the Chief Council was a cultural protocol suggested by Chief Tendera.

4.4 The totemic worldview

Kovach (2010a, p. 40) suggests that "the focal discussion of indigenous methodologies ought to be a deep concentration of worldview or paradigm". This paradigmatic directed research aligns with my conceptualisation of a methodology as a paradigmatic dimension (see section 2.3.4 on p. 42 of Chapter Two). Kovach refers to methodologies instead of methodology to emphasise that there are numerous indigenous methodologies. More importantly, similar methodologies fitting local communities under study can be developed (Dei, 2011). The totemic methodology under discussion here emerged together with its totemic African paradigm during the course of my fieldwork. To bring out the main and unique tenets of this totemic methodology and worldview, I base my discussion on Excerpt 4-1 and weave it with other data and literature.

Excerpt 4-1 is an extract from one of the conversation sessions with *ambuya* Tema in trance of *tateguru*[14] Mukono. The superscription 1 to 7 and bolding of the words or phrases or sentences in this excerpt are for ease of reference and effective communication purposes. I "kitic" analysied (this discussed in detail in section 5.7.1, p.179) this conversations to draw methodological meanings from the superscripted text within the context of the entire conversation and our actions.

[14] Tateguru is an expression which the Tendera people used to refer to an ancestral spirit

Excerpt 4-1: Emerging totemic African paradigm

I am [7]**Mukono** the son of the [7]***Shava mhofu yemukono*** **(Eland lineage) ([2]we [3]clapped hands as a cultural gesture of respect. The Elders [7]introduced me as in Excerpt 1-1 to the *tateguru* and his assistants. We exchanged greetings in a cultural way)** … (Cautioning and questioning me) Why are [1]**you** taking *nhombo* (family planning tablets)*?* **Can't [1]you see what [1]you are doing** (He shouted at me) ... **Do [1]you think long ago we were not planning [1]our families?** (**[1] We – I and the other three Elders – [3]remained silent**). ***Mambuya*** **(Elderly women) [2]told [1]our wives and daughters** … There are still here. Why are [1]**you** taking *nhombo?* … Let me [2]**tell [1]you**, [6]***unyanzvi nenjere [3]ndezvemadzinza [6]zvinobva pasi [3]kumadziteteguru*** (knowledge, skills and wisdom comes from our forefathers) … ***Kana [6]maoko ako akachena [3]madzinza anokupa njere [5]dzokurarama [1]nemhuri (***if your hands are clean your ancestors give you wisdom for survival of your family and community) … I [7]**Mukono was a great man, a chief, a hunter and a medicine man [1]with eight wives and [6]children like ants** (*[3]Tateguru* bragged). **[1]We hunted to feed [1]our families** … [1]**We [4]lived with animals in the bush ([3]*Tateguru* [2]sings and we joined the [2]singing**] … **[4]Baboons and birds are wiser than [1]us** … **[3]Your ancestors open *makwara* (path) and your eyes (**he entered a pensive mood) … **[4]To see what others do not see, [6]beyond clouds and under water, hear more than others, do what others cannot do, [1]help others** [*Tateguru* roars] … **[4]Do not eat what the baboon or bird does not eat because you will die** … [3]***Njere inhaka yomusiyiranwa*** (wisdom is a cultural heritage that you need to pass on to others) (Appendix A-01, 13 October, 2013, CT).

This kitic analysis was POEMAR and indexically based. This means that I allocated the methodological meanings to paradigmatic categories: philosophy, ontology, epistemology, methodology, axiology and rhetoric. My clustering of these expressions and actions was not exclusive to these paradigmatic categories, but each cluster or individual expression could fit into more than one category. This is because, as discussed in Chapter Two, these paradigmatic categories are interrelated and interwoven, therefore overlap considerably. As such, I use these categories for organisation and effective communication purposes.

4.4.1 The Ukama philosophy

As revealed in Chapter Three, the Tendera community, like most African rural communities, is "a strong cultural, social, and political institution" (Shizha, 2009, p. 143) but it is also part of the whole of Africa (Matsika, 2012). Its life is generally guided by the African *Unhu* philosophy that focuses on loyalties and relationships among community people (see section 2.3.3). In the Tendera community, the *Unhu* philosophy manifests through totemic *ukama*

(relationships) which are valued and maintained by the members of the community. The words *Mukono, Shava Mhofu yeMukono* (superscripted as 7) reveal the totem register[15] that prevails in interactions between the people of Tendera. They also demonstrate the importance of community totems. I established that, even where there is no direct totemic link, the Tendera participants use the *sahwira* (close family friend) concept to establish such relationships. Thus, the community is defined by a web of relations based on totems. Traditional community leadership is based on the *mitupo* and *madzinza* (clan originating from the same ancestors). Sacred places, like mountains and caves, are also identified and linked to totems by the Tendera community. This means that everybody in the community is a relative (*hama*) and is bound by relationships (*ukama)* which shapes life in it.

In Zimbabwe, a totem refers to a cultural symbol and identity of a group of people, particularly those of "Bantu" origin. It is denoted by the names of animals or body parts of animals, birds and reptiles. The totems link the people to animals, places and other life forms. It embraces how people relate to each other and see themselves in relation to others. It connects its holders to all other elements that exist in their community consistent with the indigenous proposition of interconnectedness. For example, those people of the lion clan are expected to be brave and strong like a lion. The expression *Shava mhofu yemukono* denotes *dzinza reShava* (people of the Eland totem). This shows that totems extend to and are maintained within from family level through to clans, lineage, or tribal levels from ancestors. They consciously or unconsciously link the living, not only to their ancestral history, but also to their daily living. They are the basis of relationships, such as in marriage and traditional leadership roles among indigenous Zimbabweans. The Elders revealed that Tendera community is culturally the land of the Eland ancestry. This also came out in *tateguru* Mukono's declaration of his Chieftainship during his life in the second (physical or human) world. Totems are also a basis for communication with the ancestral spirits (*vadzimu*) and, therefore, are essential connectors between the living and the spirits. They reinforce the interdependence of elements of nature and spiritualism central to all indigenous worldviews (see section 2.3.4, p. 38). This totem analysis lends support to Kwashirai (2007, p. 831) who describes totemism as:

[15]A register describes "the semantic configurations that are typically associated with particular social contexts" (Mohan & Slater, 2006, p.305). A register describes the way people use language as influenced by the subject under conversation, and the social roles and relationships among people conversing and its role in the situation.

> the cultural practice of *mitupo* (totemism) … each ethnic group, clans or kinships adopted an animal or bird as its totem. The totem acted as a 'tag' that identified and bound the group together in one large related family. The adopted species was neither harmed nor eaten by members of the group who believed it had been used to cure a chronic illness among their ancestors. Common totem animals included elephant (*nzou*), eland (*mhofu*), buffalo (*nyati*), fish (*dziva*), and zebra (*mbizi*). Totemism was also the result of the intense admiration of wild game by Africans generally.

This *Ukama* philosophy was brought to my attention in several ways and manifested itself throughout my fieldwork. The totemic-based *ukama* we established within the research group became a central feature of my fieldwork from the time I entered the community of Tendera to that of exiting it. I use a few examples to support this assertion.

Firstly, the introduction as in Excerpt 1-1 in Chapter One. The community Elder's question: "Who are you?" on first contact, physically or mediated, solicited a cultural identity response, that is, identification or introduction by totem, parents' totems, and land of origin by birth, including marital totem, where applicable. The Elders identified themselves to me in the same manner and that led to an established relationship from which a commensurate register was adopted during our interactions. Elders addressed me by my marital *Shava* totem. For instance, Head of headmen, Shava, related me to him as a daughter-in-law (*muroora*), because he shares the *Shava* totem with my husband and, at the same time, he is old enough to be my husband's father. Secondly, we totemically greeted each other each day when meeting after period of separation as "*Marara sei Mufakose*?" (How did you sleep *Mufakose*?). The Elder would respond: "*Tarara, mara seiwo Shava*?" (I slept well. How did you sleep yourself *Shava?*). Even on arriving at a homestead, I would say: "*Tisvikewo Samanyanga*" (Can I enter your home, *Samanyang*a). The *Samanyanga,* owners of the home, would respond: "*Svikai zvenyu Shava, titambireika, kwadii kunobviwa*" which translate in English to arrive *Shava*, we receive you, *Shava*, how is the welfare of others who you have left behind? The fieldwork business of each day entailed totemic cultural protocols which varied from family to family. I will elaborate more on this in section 4.3.4. In summary, the Tendera community cultural way of life is underpinned by totemic-based *ukama* among its members.

4.4.2 *Chivanhu:* an African reality

The people of Tendera revealed *Chivanhu* ontology in relation to IKoPH. "Ontology addresses questions pertaining to the nature of reality and of being" (Goduka, Madolo,

Rozani, Notsi, & Talen, 2013, p. 8). I understood the Tendera community's ontology from several messages held in their expressions and actions during our interactions. First, the session from which Excerpt 4-1 above was taken, is culturally described as "*dare ratateguru Mukono*" for purposes of *kupetera* (a meeting with ancestor Mukono for the purpose of spiritual infolding). Such types of cultural protocol meetings including the Tendera Chief Council meeting in the cave of Shati, connotes a spirituality reality. All the cultural protocols and links to the ancestors, such as those superscripted 3 in Excerpt 4-1 (e.g. *[3]ndezvemadzinza, zvinobva pasi [3]kumadziteteguru*) evidence a reality of *Chivanhu* held by the people of Tendera. Expressions like *zvinobva pasi* figuratively connote spiritualism. Similar expressions which revealed this ontology include: (1) *mishonga upenyu* (healing plants are life); (2) *mishonga yechivanhu inorapa* (indigenous plants heal); (3) *Chivanhu chine basa mukurarama kweChiZezuru* (traditional religion and healing are central to the lives of the Zezuru people); (4) *vanhu vanoziva mishonga yakasiyana siyana kurapa zvirwere zvimwe chete kana zvakasiyana* (people hold different knowledge of healing and use different plants for healing the same problems or different ones); (5*) kurapa kuri mumaoko* or *muropa* or *mudzinza* (the wisdom of healing runs within clans); and (6) *kupora chirwere hunge vokwako vachiri kukuda pano pasi* (you can only be healed if your ancestors are agreeable to it). Even the respect of taboos is an indication of this ChiVanhu reality. Together, these expressions suggest that healing is in the power of their ancestors. It resides in people in various ways that they, in turn, use in different ways because it is a gift from the ancestors.

The expressions numbered 1 to 6 can be clustered in two interrelating categories. Firstly, expression 1, 2 and 3 reveal the people's dependency on and faith in healing plants for their health and life. Secondly, the expressions 4, 5, and 6 illustrate the strong belief among the people of Tendera of the existence of ancestral spirits and the central role of the ancestors in the health community. This theme also comes out clearly in the expressions superscripted 3 in Excerpt 4-1 above. For example, *tateguru Mukono* says, "[3]your ancestors open path or opportunities and your eyes" and they "give you wisdom for survival of your family and community" to show that the cultural frames of living (life and death) among most people of the Tendera are provided by their ancestral spirits. This shows both a spiritual and a physical Tendera community reality in relation to health management. Relations are bound by totems, and this extends to the level of healing.

This African ontology clearly reveals interconnections between the spiritual and physical realms, a shared worldview feature among indigenous people. Some scholars (see Cajete, 2000; Meyer & Crawford, 2011; Ogunniyi, 2007a) concur that these worlds co-exist and

depend on each other. I try to illustrate the occasion represented by Excerpt 4-7 in which my intentions were to interact with the people of Tendera. But because of their strong shared belief in the existence, dependence and guidance of their ancestors in issues relating to health and healing, I ended up talking to spirits and visiting sacred places. Hart (2010) describes such spiritual and physical relationships as "reciprocal dependence" which describes the living people's reliance on spiritual wisdom. Like in Excerpt 4-1 above, it was the mediation of *ambuya* Tema that enabled us to communicate with the *tateguru* Mukono. Within this reciprocal ontological element, living people perpetuate natural processes in the physical world from the spiritual realm through ceremonies and rituals (Cajete, 2000). Matsika (2012) describes these realms as first (spiritual) and second (physical) worlds. He alludes to the spiritual world as being more powerful than the physical. Indigenous scholar, Ermine (1995) of the Cree First Nation in Canada, talks of these worlds as "outer physical space" interacting with cycles in "inner spiritual space" through spiritual ceremonies. In Zimbabwe, such cultural symbolic practices, including the spiritual infolding protocols like the event represented by Excerpt 4-7 above, are not led by every person, but by designated people of the same ancestry. This once again presents another totemic connection. Thus, the principle of reciprocity describes mutual relationships and benefits through meaningful exchange and interdependence of life oriented skills and knowledge. Thus, IKoPH is central to life, and for it to serve its function in the physical world, there are reciprocal exchanges between the spirits and the living. This is made possible through the ancestry deity of healing in which the totem is central. Therefore, totemic reciprocity and spirituality are key aspects of the people of Tendera's reality.

4.4.3 Epistemic perspectives

Hart (2010, p. 8), in agreement with other indigenous scholars says that

> an indigenous research paradigm is structured within an epistemology that includes a subjectively based process for knowledge development and a reliance on Elders and individuals who have developed or are developing this insight.

The insight referred to here is a person's cultural gift and skill of negotiating for knowledge from his or her ancestral spirits (Frommer, 2003). Epistemology is a paradigmatic dimension that relates to beliefs of what knowledge is. Two statements uttered by *tateguru* Mukono in Excerpt 4-7 above show that this cultural talent is inextricably interwoven with spiritual healing expertise. He says "let me [2]tell [1]you, knowledge, skills and wisdom comes from our forefathers". As a spirit himself, this utterance shows the roots of knowledge from the spirits.

He also said: “If your hands are clean, your ancestors give you wisdom for survival of your family and community”. This shows the rise of an indigenous epistemology from the ontological perspective of interconnectedness between the physical and the spiritual worlds.

Kovach (2005) frames three main general features of indigenous worldviews from which indigenous epistemologies can be derived. First, the intergenerational indigenous teachings inclusive of storytelling hold cultural meaning that reveals the particular people’s epistemic presumptions. Excerpt 4-1 can be regarded as part of *tateguru* Mukono’s life story. This story reveals knowledge, such as the family planning role of Elderly women in a community. This is evident in his caution about taking family planning tablets. He says, “Do [1]you think long ago we were not planning [1]our families? Elderly women [2]told [1]our wives and daughters …” This reveals an epistemic view that knowledge is what one is told by an Elderly and specialised person in that field. The other forms of oral revelation of knowledge that emerged in this study and are evident in Excerpt 4-1 are songs, metaphors and incantations. For example, knowledge is embedded in cultural practices such as *kupetera*, *matare* and *kuwombera* that take place simultaneously. Their practices during the course of my fieldwork showed that they overlap and are closely linked. Though these three concepts are difficult to translate into English, I tried to translate them for communication purposes. *Kupetera,* which I describe as spiritual infolding, involves presenting one or more of the cultural symbols to the Elders shown in the following Figure 4-1.



Figure 4-2: Cultural symbols embodied in *kupetera* process

The knowledge is held in the significance of these cultural symbols which *ambuya* Zika illuminated to us (the Deve learners participating group and myself) in one of the sessions. The black and white cloths represent ancestral spirits and the Great Spirit (God, *Nyadenga* or

Musiki as the Elder people of Tendera referred to him). These were evident in sessions where assisted healers got into spiritual trances. *Ambuya* Zika explained that black symbolises that I am here in this spiritual form because I have exited this second world through death. The use of cultural symbols is a sign of respect and acknowledgement of the central role of spirits in our lives. The wooden plate stands for the life styles of the past and, more importantly, the significance of plants in our lives. She elaborated that these should be as much respected as the human beings themselves. She emphasised the need to preserve and conserve plants in the community of Tendera. One way that I established as a vegetation conservation strategy was the constitution of taboos and their roles. The unprocessed tobacco ball in the plate, *Chambwa chaMambo,* is powdered into the snuff (*bute*) and put in a container referred to as *nhekwe* (the black object below the $5.00 note). Snuff "stimulates communication and negotiations between us and our ancestors" *ambuya* Zika explained. The five dollar note which is representative of an amount of money is the *tsigiro* (supporter) that serves as a gesture of appreciation and respect for the roles assisted healers play in the community. The Elder or healer or *munyai* (mediator) then presents the items together with the issue at hand to *matare* through *kuombera*.

The spiritual infolding (*kupetera)* process evidences three *matare* types. These manifested themselves as hierarchically interrelated. *Matare* is a plural of *dare.* which I describe as cultural meetings from Shizha's (2009) definition of *dare* as an official meeting forum for debating issues about community life and to make good of it. This spiritual infolding cultural process began with a human level cultural meeting that involved me and the Elders or healers in "ordinary" states. This was followed by presenting the issue to the spirit, like on the occasion from which Excerpt 4-1 was retrieved. This is a second type of cultural meeting involving a human being and a spirit. The assistant to *tateguru* Mukono explained that I would get a reply from ancestors of Tendera after at least three days. This reveals a belief in cultural meetings that involve ancestral spirits in their spiritual world (*nyikadzimu*). The Tendera people believe that all requests, including those of conducting research in their community, are debated and sanctioned by these cultural meetings. The reply is passed to the humans through the mediating of assisted healers, like *ambuya* Tema, who are bestowed with the cultural gifts of dreams. Community issues are debated through a referral system, starting from the human level up to the spiritual level through the spirit transactional level. These three cultural meetings hierarchically relate in an order of control and authority with the spiritual meetings occupying the most powerful level and reducing in rank with the meeting of the living being the lowest level. The spirits occupy the highest level of power and

authority, followed by their mediums and Elders, then other adults in the community with the children at the lowest level (Matsika, 2012). All these types of meetings released epistemic views of knowledge as oral and spiritually embodied.

Kuombera is a ritual of clapping and incanting in a particular place, posture and direction. It is a gesture of appreciation and respect. This aspect was not new to me. I had practiced and witnessed it many times when my father went into a trance of the healing spirit. However, it was something that I practiced with no understanding and without bothering to understand it. Elders never explained to children the reasons behind such practices. In my Shona culture, there are certain aspects of life that you see and keep to yourself for the rest of your life. These cultural protocols are a preserve of key family people of the same totem as the spirit.

Secondly, Kovach (2005, 2010b) says that indigenous epistemologies carry indigenous languages, emphasising verbs. This brings out a practical knowledge view. *Tateguru* Mukono brought this out when he bragged that "I [7]Mukono was a great man, a chief, a hunter and a medicine man [1]with eight wives and [6]children like ants. [1]We hunted to feed [1]our families". Thus, the knowledge is embodied in doing, such as hunting, leading and healing. *Tateguru* Mukono also uses rich metaphors that illustrate a view of knowledge storage in metaphors. For example, he said: "[3]Your ancestors open paths and your eyes [4]to see what others do not see, [6]beyond clouds and under water, hear more than others, do what others cannot do, [1]help others". These expressions imply diversities in cultural knowledge that are linked to ancestors, therefore they are totem based. Frommer (2003) describes this knowledge diversity as an ancient ancestral heirloom privileged to particular families and individuals. Epistemologically, knowledge is therefore relational.

Thirdly, indigenous epistemology is garnered and stored through dreams and visions. It is also derived from intuition and introspections. The healers who participated in this study all narrated that their journeys to healership started from dreams (For example, Excerpt 6-10, p. 223). Such dreams hold several forms of knowledge that include content, processes, values and pedagogy. This illustrates a view of knowledge as revealed. In summary, totemic epistemology is basically subjective, oral, practical, related and revealed. One therefore must expect to find in it concrete and understandable aspects as well as intuitive aspects (those described in literature as mystic and mythical).

4.4.4 Communalism

Tateguru Mukono introduced himself as "I am [7]Mukono the son of the [7]*Shava mhofu yemukono.*" This situated him in a family, clan, and tribe of the Eland lineage. Such an introduction shows that totems situate individuals in cultural groups. They serve as cultural identifiers of people. Belonging to a totemic group implies one has to uphold the group principles and values. As such, an individual, in doing and talking, is representative of his or her people rather than the self. Four important value principles of the people of Tendera pervade the philosophical, epistemological and ontological discussions above. These values relate to being a *Zezuru* and doing *ChiZezuru* in the community of Tendera. These principles aim at shaping how an individual is expected to relate to and with others. I visualised these values as shown in Figure 4-3 consistent with the *Unhu* philosophy of togetherness and oneness.

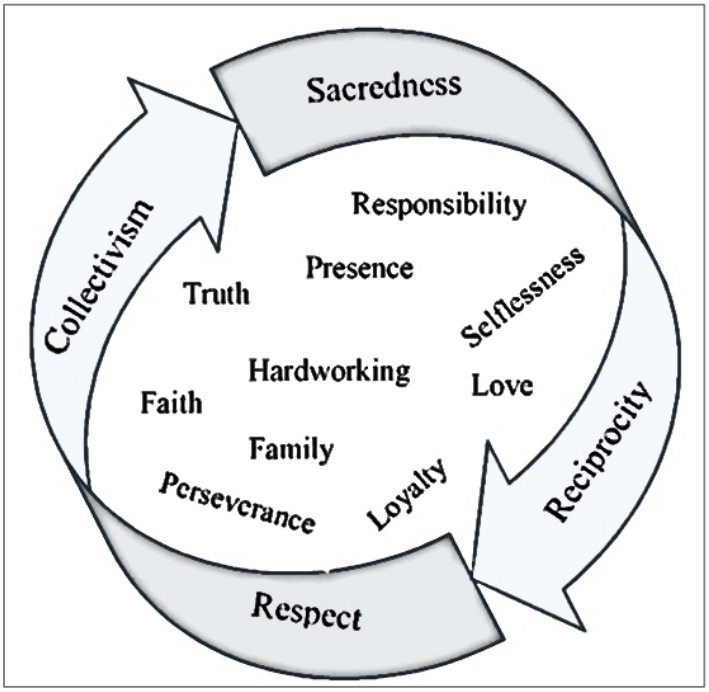


Figure 4-3: Totemism value frame

The people of Tendera oriented their acts and words towards a pluralistic register that describes an individual's being and doing *Zezuru* among others to reveal the maintenance of totemic relationships on the principle of collectivism. The words, including we, our, us and other superscripted 1, in Excerpt 4-1, illustrate this pluralism. The inherent totem of a cultural group member defines not only collective approaches in doing and speech but also reflects the cultural identity of an individual. I was identified by my marital Shava totem, which earned a family member position in the Shava people of Tendera community. The

relationships shifted from family to family depending on my maiden totem and others I carried along with me. Totems make an individual accountable to his or her relations. Totemic relations also carry with them differentiated levels of power and authority. All this culminates into a collective endeavour through the binding of cultural identity from values such as commitment.

Secondly, the principle of sacredness was also evident in conversations and activities that were culturally oriented. The value of sacredness reveals a maintained relationship between the living and their ancestors. This value emerged in several ways. Firstly, all the Tendera participants demonstrated knowledge of their *nzvimbo dzinoyera* (sacred places). For example, the place where people of twelve totems reached some agreement (*nzvimbo yematenderano emadzinza gumi nemaviri*), taboos (*zviyera*) and rituals (*muko*). These values of sacredness can be viewed as a way of developing in people the value of respect for people, ancestral spirits and places.

Third, the principle of reciprocity as revealed in the *Chivanhu* reality discussed above embraces the value of dependence and mutual benefits. On several occasions, after a session with the community, the people I would have interacted with offered me cultural presents. These included indigenous fruits, mats and agricultural crops. I later on realised that it was the people of Tendera's way of acknowledging and appreciating my presence in their community. The fourth principle of respect in relation to the Tendera people can be characterised in four main ways. In the first instance, it relates to what *Sabhuku* Gomo referred to as "listening and talking with the heart". This metaphor describes respecting the Tendera cultural ways as part of one's culture. Secondly, listening also emerged as another crucial aspect of respect. Like in Excerpt 4-1 above, we showed our respect for the teachings we were receiving from *tateguru* Mukono by remaining quiet and attentive. Thirdly, respect was signified in the doing as instructed. Fourthly, language is considered as a sign of respect.

4.4.5 ChiZezuru

The Zezuru language used in the Tendera community showed culture symbolic, diglossic and register features. The cultural symbols as the ones shown in Figure 4-2 above non-verbally communicated the ancestral spiritual traditions and African religions related to the Tendera community. The language which *tateguru* Mukono used during the conversation from which Excerpt 4-1 was extracted shows a language pattern that pervaded my fieldwork as a high variety of Zezuru that dominated conversations involving cultural issues. This finding emerged in Mpofu et al. (2014a), an article published from this study. The register shows

knowledge of relationships and knowledge of expertise. For example, titles of *ambuya* or *sekuru* either depict community roles such as healing practices or Elderly respect by gender. In similar way, *tateguru,* shows respect and the identity register of ancestral spirits. In other instances, people addressed each other by totem Shava, Mhofu and Samanyanga to respect the ancestral clan.

4.4.6 Totemic methodology

In Zimbabwe, participatory research in indigenous communities "has a long history and continuity" Shizha (2009, p. 142). Shizha also teaches us that, in these communities, production and utilisation of knowledge has always been a collective venture. The plural register, as supported by expressions superscripted 1 in Excerpt 4-1, illustrates the collective as a key feature of this totemic methodology. This is the way the people of Tendera who participated in the study mostly talked in conversations oriented towards IKoPH or cultural issues. We participated in groups in issues involving cultural protocol, such as the session from which Excerpt 4-1 was extracted. During this stage of the *kupetera*, I was in the company of Elders and together we participated in it. The collective participation characterised the session with the Chief Council in the cave of Shati. The assisted healers and Elders operate in groups in order to make decisions that affect their communities. I was always in the company of an Elder who was appointed as a local person by virtue of being a teacher in the school sites of research. I identify these as "link teachers". Most importantly, the two link teachers I worked with are of the Shava totem. So, from the Tendera Elders' point of view, they were representative of my husband. I related to them as *babamudiki* (younger husband). This research was associated with the family of the Shava people to show yet another collective tendency of the Tendera people's ways of doing in relation to their cultural issues. Many decisions were made within *matare* which again evidences the collective feature of the totemic methodology. In fact, Hart (2010) identifies collective features as key to indigenous methodologies. The difference lies with their origin in different communities. In some indigenous communities, the application of this collective approach might not come from totemic relationships but what determines such relationships in that particular community.

Orality is the second key characteristic of this totemic methodology. It [orality] refers to non-written intergenerational teachings inclusive of dreams, visions, stories, talks, ceremonies and rituals (Dei, 2011). As a totemic methodological characteristic, orality manifested itself in many ways. The Elders described all the sessions I held with them as *matare* to underscore

the oral nature of knowledge exchange or gaining. Excerpt 4-1 reveals several examples of orality features including the part of *tateguru* Mukono's talk that can be described as a narration of his life. Singing is also an oral mode of transmitting knowledge. Orality is not unique to this methodology but rather is a feature that cuts across all indigenous methodologies. What characterises orality uniquely to this totemic methodology is the cultural knowledge that is contained in such oral forms. For example, the incantations and songs which were done at regular intervals during our session with *tateguru* Mukono were in praise and recognition of the *Shava* people. This is because the *matare* in which we participated was in line with the Shava ancestry and custodianship. The contents of incantations and songs changed with totems. But, most importantly, oral methods remained consistent across participants. For example, in *dare* session with the *sekuru* Miti in trance of *tateguru Dube*, we honoured the *Mbizi* (Zebra) ancestors in songs and incantations.

Sekuru Miti narrated how he had learnt about the plant he uses to treat snakebites from the fighting snakes (see Excerpt 6-9, p. 222 for more detail). This concurs with *tateguru* Mukono's version in Excerpt 4.1 that "[4]Baboons and birds are wiser than [1]us … [4]Do not eat what the baboon or bird does not eat because you will die". This reveals observation from nature as a third key feature of the totemic methodology. Barnhardt and Kawagley (2005, p. 16) emphasise that "empirical observation in natural settings, pattern recognition, verification through repetition, and inference and prediction" is key feature of indigenous knowing. However, what links this to totems and ancestry is the belief held by Elders and assisted healers that such observational experiences are guided by ancestral spirits. This illuminates what *tateguru* Mukono meant when he said "[3]Your ancestors open paths and your eyes [4]to see what others do not see, [6]beyond clouds and under water, hear more than others, do what others cannot do …". *Sekuru* Miti's story of becoming a healer showed that once the first man in the family has been spiritually led by an ancestor to discovery of the healing plant, this knowledge is then passed on orally to his or her protégé. This knowledge then runs in the family from generation to generation. Thus, this connects knowledge holding to totems. The receiver of the knowledge does not question whether it works or not but goes on to implement it. This is basically because it is being passed on by a trusted relative whose main concern is the survival of people. This reveals a strong sense of faith and mutual trust among such families.

Fourth, a practical characteristic of the totemic methodology also emerged in both words and actions. This means learning embedded in participating or doing. I realised the practical nature of this totemic methodology in sessions with healers which tended to theorise about

how I would use the plant as a medicine. All the healers' sessions incorporated at the end the practical aspects of going to the forest to collect the plant. They demonstrated how to use it and emphasised the need to make use of plant medicine to heal people. In revealing this practical feature of the totemic methodology, village Head of headmen, Shava, said "no one seeks this type of knowledge without *ropa rekurapa* … Your ancestors are pushing you into this. At the end you will help many people". Such beliefs were expressed by Elders and healers many times throughout the duration of my fieldwork. I later on read in literature, such as Matsika (2012), that seeking of healing knowledge is presumed to be an indicator of becoming a healer in the future. Hence, the practical feature of the totemic methodology is the indigenous goal of knowledge production for use in real life in order to sustain life. Kovach (2005, p. 114), asserts that indigenous people strongly ascribe to the view that "one seeks knowledge because one is prepared to use it". Matsika (2012, p. 130) also espouses that, from an African indigenous sense, "one does not pursue knowledge for its own end … usefulness, feasibility and practicality governed the purpose of acquiring knowledge and extent of pursuit of such knowledge".

Fifth, spiritual and Elders guidance emerged as another key feature of this totemic methodology. The expressions superscripted 3 in Excerpt 4-1 exemplify this character of totemic methodology. For example, *tateguru* Mukono's expression that "your ancestors give you wisdom for survival of your family and community" as interpreted together with "to see what others do not see, hear more than others, [and] do what others cannot do" reveals that the cultural wisdom held by Elders and healers are guided by ancestral spirits. In matters of survival and healing, it matters who you are totemically.

4.5 The IAI methodology: a western and indigenous research integrated approach

I synthesised the western and totemic (indigenous) methodologies discussed separately in sections above into this IAI methodology. These two components, that is, the classical interpretive and indigenous interpretive research frames, complement each other in this integration research in an African context with a long colonial history and situated in a world of globalisation. Central to the IAI methodology is the position that research involving indigenous people in their communities where the two cultural worlds are in existence, irrespective of their status, needs to be itself western and indigenous research integrated. This integrated research approach caters for the dual worldviews and different inclinations indigenous people are likely to hold about healing with plants as a result of their exposure to both worlds, irrespective of their relative status. More importantly, this methodology

provided me with two “eyes” (frames) for the investigation of the phenomenon that is made up of two different constructs situated in worldviews that are distinctly different.

Figure 4-4 below diagrammaticaly represents this IAI methodology.

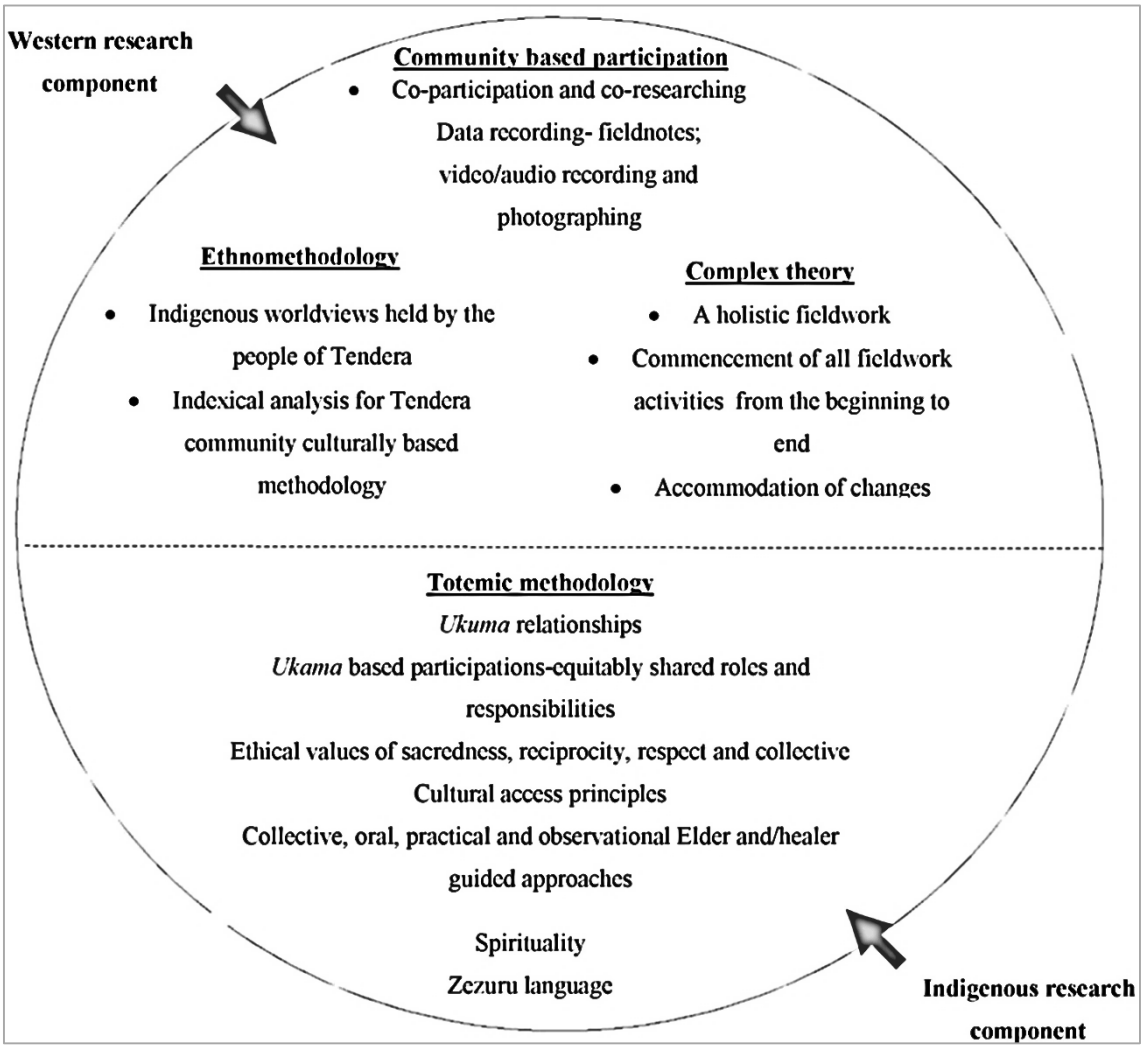


Figure 4-4: The synthesised IAI research methodology

The broken line splits this IAI methodology into its two research frames, the western and the totemic. The upper half circle represents the western research frame. It contains research tools that I drew from the qualitative family of research to understand the classroom science constructs. Its upper level shows that fieldwork was initiated from western qualitative research and then took an indigenous perspective with the emergence of the totemic methodology. The lower half circle depicts an indigenous frame, the totemic methodology from which I drew indigenous research tools that I utilised to explore the IKoPH within the Tendera community.Together, the two frames-western and totemic provided me with a holistic complementary research approach from which I drew research tools as demanded by

the situation. I acknowledge that it is “who I am” that guided my selection of this approach, its components, how I used it in the field as well as the report on my findings.

4.6 In conclusion

In conclusion, I reiterate earlier points, that IAI methodology proposes contextual immersion, and the use of tools and methods appropriate to the Tendera people as indigenous Africans participating in the study. It proposes an *ukama* based participatory approach that, by any means, does not negate Western research approaches. Instead, the African wisdom of synergy expressed in the proverb “one finger cannot kill lies” captures the essence that, to get a more complete and realistic understanding of the integration phenomenon, there is a need to value the alternate approaches to investigating issues that involve indigenous and western knowledge. This frame informed my fieldwork discussed in the next chapter.

5 CHAPTER FIVE: FIELDWORK

5.0 Introduction

The fieldwork, I discuss in this chapter is organised around seven main sections for the purposes of effective communication, but, in practice, these categories overlapped considerably. They are: (1) duration and structure; (2) participation; (3) ethically navigating the fields; (4) the qualitative data; (5) generating the data; (6) processing of the data; and (7) exiting the field.

5.1 Duration and structure

I commenced fieldwork in mid-July 2012 and ended in April 2014, which gives a total period of twenty-two months. However, in effect, I conducted this fieldwork in fifteen (15) months due to two breaks of low activity to inactivity beyond my control that were 31 October, 2012 to 31 December, 2012 and 10 April, 2013 to 10 September, 2013. Appendix A-01 is a record of participants in groups and individuals, their locality, gender, category of participation, role and the sessions we engaged in.

My first port of call, for the purposes of applying for research authority in Zimbabwe, was the head office of the Ministry of Education. Prior to this visit, I had spoken to many people with the aim of gathering contextual information about Chiweshe, and, in particular, the Tendera community, the location of my study. I had anticipated this information would guide me to this community, which I knew little about. I then decided to commence data generation by gaining entry into the field, initially, for the purposes of obtaining contextual information. However, I also realised that I could not ignore the rich data of IKoPH and its integration into classroom science that the people I initially met were providing. I then decided to commence data generation while seeking authority to carry out my study. Data generation inherently brought in other fieldwork activities, such as its analysis and a continuous review of the literature. This effected a “criss-crossed” structure to my fieldwork that catered for many participants (multiple sources) who assumed different, but necessary roles in this study and were located in different places (multileveled) (see Appendix A-01). This change in structure did not only offset my proposed three linearly related phases of conducting fieldwork, but also resulted in alterations of all the fieldwork activities.

My discussions that follow refer to Appendix A-01.

5.2 Participation

Participation in this study was varied. It comprised of “key” and “core” participants and me as shown in Appendix A-01. As per my proposal, the core participation group consisted of the healers, teachers and learners in the Tendera community. The “key” participants were the people who emerged during the course of my fieldwork and were central to directing the study and to gain access to the Tendera community. They demonstrated to be critical and indispensable to my effectively negotiating nested fields of the Tendera community (see Figure 3-1, p.81).

5.2.1 Key participants

Although I was aware that changes and/or modifications are characteristic of interpretive research (Bogdan, & Biklen, 2007; Patton, 2002), I did not anticipate the key category participation when I proposed to undertake this study. These key participants introduced into this research what Liamputtong (2008) refers to as “cultural sensitivity”, meaning “knowing the cultural context of the group with whom the researchers wish to work with” (p. 4). These key participants, such as Mr Choto (see Excerpt 3-1 p.86), did not only give consent for my study to take place in the community of Tendera but also gave directions and guided the fieldwork schedules. In the Tendera community, such participants, like the - Chief Council and committee of leaders, were critical in guiding cultural protocols which enabled me to access the inner knowledge layers of the community’s plant healing knowledge. I did not doubt their practicalities of denying me access to Tendera community and its inner plant healing knowledge space. So, without them it would have been almost impossible to get entry into the community and access knowledge from the Tendera participants. My description of this group of participants as “key” is cognisant of the strong access and research authentications these people held. This has been also a main finding in the methodology part of this study (Mpofu, Mushayikwa, et al., 2014a). This study also revealed that key participants, particularly those with traditional roles, are rich sources of IKoPH. As such, I could not just ignore them, but rather incorporated them into the study to enrich it.

There were many people who were involved in this study as key participants (Appendix A-01). These participated in this study in three main ways as groups, individuals, and both (individual and group) settings. The group participation of this study comprised of two leadership committees (Deve and Gomo) and the Chief Council. The Chief Council was incorporated into the participation of this study by virtue of the traditional leadership role of

Chief Tendera. Chiefs in Zimbabwe operate in council setups (Zimbabwe Traditional Leaders' Act, 1998). Appendix A-02 shows the twelve membered Chief Council (2 females and 10 males) who participated at community level. This council oversaw the project issues from the two School Leadership Committees. As described in Chapter Three, each committee of leaders participated within its village and comprised seven members. These were the four members of the school administration board, the Headman of village heads, the head of the village in which the school is located, and the school development committee chairperson. The particular names of the people who participated as individuals and in group setting are listed in Appendicies A-01 and A-02. These committees worked with or without me, in tandem with spirit mediums and their ancestral spirits. This is how *ambuya* Tema, a spirit medium of *tateguru* Mukono, got to participate in this study. Essentially, these key community group participations culturally sensitised the progression of my fieldwork in Tendera. Their roles can be likened to what Liamputtong (2008) describes as Research Project Advisory Committees.

The thirteen (13) people who participated as individuals and key participants were officers in different institutions and stationed at different levels (Appendix A-01). The five (5) education officers were stationed at the national, provincial, district and school levels in the Ministry of Education. Two (2) officers were stationed in the offices of the Ministry of Land Development at Mashonaland Central Provincial and Chiweshe district levels. The other two (2) were medical practitioners at the Deve and Gomo local clinics under the Ministry of Health. In this key participation group, there were also two (2) members of ZINATHA and two (2) renounced researchers who participated in their individual capacities. Of significance to the composition of participation in this study, is the representation of various organisations with interests in the issues under examination. All these people held leadership roles in their institutions and provided the study with an adequate breadth and depth of the integration of IKoPH into classroom science. Besides contributing official views, these people also contributed as parents and indigenous people of Zimbabwe.

I interacted with some of the key participants in both the group and individual settings. These were the three (3) village heads and the two (2) link teachers. On arrival at the community of Tendera, I sought authority to operate within villages from the village heads. It also became important for me to follow up with these village heads on certain issues that needed historical and political clarification that would have emerged in the leadership committees or other sessions in their respective villages. The participation of the village heads as individuals was

also to uphold the ChiZezeru cultural value of talking with Elders in their home environment and respecting their right to keep informed about what goes on in their villages.

The link teachers, Mr Rusa and Mr Chima, represented their schools, communities and the researcher (me). They were jointly appointed by the leadership committee members in this study. They acted as cultural brokers among the three interacting worlds: the researcher, the school and the community. Their respected qualities lent them these link responsibilities. Mr Rusa teaches history at Gomo School. He is a local person of the Tendera community and has been teaching at this school for more than ten years. He holds a Bachelor of Arts degree and a post graduate certificate in education. Like Mr Rusa, Mr Chima, of Deve School, is a local person. He teaches geography and has been in the school for more than seven years. He holds a diploma in teaching at secondary school level. They helped me to settle culturally in the Tendera community by advising me on language, protocol and community concerns which were expressed in my presence or absence. We also brainstormed on what we identified as emerging from the study. In my absence, they provided a proxy representation that upheld the Shona proverbial expression of "*kure kwemeso nzeve dzinonzwa*", which means "you don't have to be at a place to know what happened there, the information will get to you by other people." I was aware of possibly missing the real messages intended due to different interpretations as such information was fundamental to decision making. Furthermore, I always had room for cross checking such information as we were together most of the time. The link teachers also served as language intermediators. As Denzin and Lincoln (2008) purport, in this cultural brokering role, these link teachers helped me to make cultural sense of some ChiZezuru expressions.

The contribution of key participants was essentially helpful in three main ways. Firstly, it helped me to familiarise and understand the knowledge of place, that is, the Tendera landscape, locality, experience and relations (see Cajete, 2000, as examined in Chapter Three) that influenced my decisions and shaped the direction of my fieldwork. Secondly, it gave me access to core participants and authentic data generation that largely depended upon these people. Thirdly, the continuous involvement of some key participants, for instance the Chief Council, the committee of leaders and the link teachers, created spaces for member checks of data generated and findings with the core participants. The Elders insisted on feedback at intervals that I complied with. This resonated well with the Elders' control of the research principle of indigenous participatory research (Hart, 2010). It effected member checking which Creswell, (2007) asserts as a research quality control tool necessary in

authenticating both the data and findings of an interpretive research (Lincoln, & Guba, 1985). The feedback sessions naturally generated new data.

5.2.2 Core participants

On completion of fieldwork, there were thirty-three (33) participants in this core category: two (2) teachers, seven (7) healers, and twenty-four (24) learners.

5.2.2.1 Teachers

Two female student teachers, Ms Tsitsi Zivo and Ms Chipo Vimbo, stationed at Gomo and Deve schools respectively, participated in the study. When this project started, they were both in their final year IV of training to get a diploma in science education certificated teachers through a Virtual and Open Distance Learning (Distance Learning-see footnote 2, p.2 for the reasons behind my use of this short name) programme offered by the Bindura University in Zimbabwe. They were now specialising in the area of biology teaching after a general study of a combination of biology, chemistry and geography. They were both recruited into this science teacher training programme from a background of practising as relief (untrained) science teachers in secondary schools in the province of Mashonaland Central. The inception of the Distance Learning programme aimed to cover the critical shortage of science teachers in Zimbabwe which was created by cross border skills drain (Mpofu et al., 2012). The two teachers were not my initial choices for participation in this study because they did not meet my initial teacher selection criteria of one year post-qualification experience of science teaching. Ms Zivo of Gomo School replaced Ms Ndizvo who had transferred to a semi-urban school outside my research boundaries. Ms Vimbo of Deve School replaced the participation of Mr Ndega who left the country during his vacation leave from 1st September to 31st December, 2013. Both Mr Ndega and Ms Ndizvo were diploma certified science teachers. These positions were filled in by relief teachers. As such, I found it reasonable to work with student teachers who, on completion of the project, were qualified teachers.

Ms Zivo is a traditionally married young mother of one. She was born and grew up in the Province of Mashonaland Central in a neighbouring district of Muzarabani (see Figure 3-3, p. 90). She stayed with her husband in Centenary that is about 30 km from Gomo. At the time of this research, she was staying in Gomo and only went home to join her family on some weekends and during school holidays. Ms Zivo comes from a family that practices healing with plants. She is also an individual healer practitioner. In revealing her healing expertise,

Ms Zivo identified a teacher couple whom she worked with at Gomo School, Mr and Mrs Mute who also became key participants. Both Mr and Mrs Mute are business studies diploma trained teachers and have been teaching in Gomo School for more than five years. Mrs Mute said she had been suffering from a western medically diagnosed heart problem since she was in Form Two. Ms Zivo claimed to have treated Mrs Mute of this disease using a medicine from a plant with which her father also treated her. Mr and Mrs Mute come from Mashonaland East. Their indigenous language is also ChiZezuru. The couple confirmed the treatment Mrs Mute received.

Like Ms Zivo, Ms Vimbo grew up in Mashonaland Central but in another district of Mount (Mt.) Darwin (see Figure 3-3, p. 90). She is also traditionally married and a young mother of one. She stays with her husband in Muzarabani, another district in the Mashonaland Central Province. Both of these teachers were born in large families of six and nine respectively. They both speak ChiZezuru. However, Ms Vimbo, by virtue of growing up in Mt. Darwin where Korekore is the predominant Shona dialect, is also proficient in this dialect. Both Ms Zivo and Ms Vimbo attended primary school in their respective rural districts. Ms Zivo attended a day secondary school in Centenary town whilst Ms Vimbo attended rural day secondary school in Mt. Darwin up to advanced level. I considered the backgrounds of these two teachers rich and balanced enough to inform issues relating to IKoPH and classroom science as well as their integration.

5.2.2.2 **Healers**

I included the healer participation group because, as experts in indigenous healing with plants, they were potentially rich in IKoPH. They are also recognisable second world custodians of this knowledge (Frommer, 2003; Hewson, 2012). Several scholars suggest collaboration and others have collaborated with Elders and indigenous practitioners in researches that involve indigenous knowledge (e.g. Belczewski, 2009; Brayboy & Maughan, 2009; Glasson, Mhango, Phiri, & Lanier, 2010; Lee et al., 2012). The original plan of selecting healers among ZINATHA membership was overridden by a need for healers who were more authentic and eminent in their community.

A total of seven healers participated in this study (Appendix A-01), an extension from the two I had initially proposed. This change was prompted by the critical observed incidents (COI) based "sampling" approach of healers. Critical observed incident acted as both a sampling approach (as discussed in section 5.2.4 below) and a method of generating data (as

discussed in section 5.4 below). This method is effective given the known difficulties of identifying authentic healers. In brief, critical observed incident describes how I picked up happenings or hearings as they emerged and followed them up. The four healers of Deve village comprised two assisted healers (female and male) and two individual healers (female and male). All three healers in Gomo village were male individual practitioners. These seven healers ranged from ages 33 to 79 years. All five male healers are indigenous people of Tendera by birth and have lived in this area all their lives. The two female healers are resident in Deve by marriage, having originated from Masvingo and Matabeleland respectively. Their indigenous languages are Karanga and Ndebele respectively, but both are proficient in ChiZezuru. They both have been staying in Tendera for more than 35 years.

5.2.2.3 **Learners**

The learners participated in class or group settings. I included learner participation groups because they are direct consumers or recipients of the school curricula. Their voices needed to be heard as critical science education stakeholders to inform the direction of this integrative classroom science reform. I also viewed these learners as intersectionally positioned between their ways of knowing in the Tendera community and the western oriented classroom science ways of knowing. Logically, I assumed that their inclusion would provide balanced views of both their home and school worlds. In addition, I recognised that these learners are representative of the youth who would be Elders in their communities and of different organisations in Zimbabwe in the future. This gives the learners a special generational linking role. During the period of my fieldwork they were recepients of any knowledge the Tendera community passed to them by their Elders. In the future, these learners would pass it on to the youth of that generation. Thus, in terms of the community's knowledge, these learners form agents of protection, conservation and promotion of their knowledge and cultural identity. Any knowledge that these learners expressed were insightful of the nature of indigenous knowledge that they gained from the community. Their voices about integration indicated how they valued both the indigenous knowledge of plant healing and western science as well as what they considered as relevant to learn in science classrooms. The purpose of this section, therefore, is to discuss the group characteristics of the learners who participated in this study. The learners' individual characteristics are discussed in the findings sections within the context of their contributions.

I worked with Form One (F1) learners at Gomo School and Form Two (F2) learners at Deve

School. The list of these learner participants per School are provided in Appendix A-03. The absence of a national public exanimation at this Junior Certificate level of participation freed the fieldwork from public examination. It created more time for this fieldwork in the sense that it allowed us to work up to the last day of term in December. It also provided us with more contact time per week when the teachers were busy with the invigilation of the examination classes. Working with non-public examination classes also implied more learner concentration time on the project.

Nineteen (19) girls and (5) boys participated in the study. Their ages ranged from 13 to 16 years. I started with twenty-three (23) girls and six (6) boys in February 2013. Luke, the only boy among eleven (11) girls in the Gomo participating group, later opted out. I did not pursue Luke's reasons for withdrawal in conformity with the western research ethical principle of the right to withdraw (see Table 5-1 under section 5.3.1 below). However, I believe that he felt out of place given a strong gender divide that I know exists in the Shona culture. Rujeko also dropped out of this group. Tanya, in this group, later transferred to another school. At Deve, Idi, a female participant got married while Chiedzo transferred to an urban school during the course of the fieldwork. This left fifteen (15) Gomo learners, ten (10) girls and five (5) boys up to the completion of my fieldwork.

This learner category of participation reflects a female oriented participation in this study. This ratio of participation was not intentional. Rather, it was a consequence of ethical considerations of voluntary and parental consent. Most of those who did not join in the project were denied participation by their parents or guardians, though they all said through the link teachers that they were willing to participate. They cited their Christian beliefs as the major reason for not joining this project. Interestingly, all the participating learners indicated that they were members of different Christian denominations. Twenty-three (23) learner participants were ChiZezuru speakers. In addition, it is highly possible that my Shona cultural emphasis on gender differences, roles and responsibilities influenced the parents' and learners' decisions on whether or not to consent to taking part in this study. They may have felt that girls would work better with a female researcher than boys. I did not pursue the reasons behind non-consenting decisions because I feared that this could send wrong signals that I was coercing for participation. In indigenous or western qualitative research, this would be tantamount to a serious breach of ethics.

These learners all stayed in the villages surrounding their respective schools (see Figure 3-5,

p.108). Gono, a male participating learner of Deve, was a Karanga speaker. He stayed with his parents at a local primary school where his father was teaching. These learners had a diversified guardianship that included biological parents or relatives such as uncles, aunts, grandparents, sisters and brothers. More than half of these learners were orphans. But none of them stayed out of family relations, and they demonstrated that they were well looked after. This observation upheld the totemic values of *ukama* and *Unhu* at large as discussed in section 4.4.1 (p. 129) in Chapter Four.

5.2.3 Self-participation

I assumed a researcher-participant role in this study. As a participant, I self-generated data through introspections alongside reflections on data generated with others and emerging findings including my epiphanic moments. I kept a diary of these reflections. I adopted several roles including learner, teacher, patient and apprentice. My roles within different settings changed with the nature of the totemic relationship. For instance, when I assumed the first-born position in a family I was also allowed to act as a leader. Changing roles was not a problem to me because it fitted well with my background as I have positioned myself in Chapter One (see section 1.5, p. 12). I drew from this experience reflections on guidance given and made decisions on the next move. I also drew from the Tendera totemism value framework and my Karanga cultural background to have faith, be humble, reciprocate and respect others and their sacred aspects (see Figure 4-3, p. 137). One shared dimension of respect among the Shona people is the expectation that younger people and women do not challenge the decisions of the Elders. But, on isolated occasions, I was open and forthright in contradiction to the cultural value of respect. For instance, at one point, Chief Tendera chose a certain group of people for a ceremony that was outside his cultural jurisdiction. Acting on tips from the Gomo school leadership committee, I requested that this group be excluded. I had weighed the consequences of being culturally respectful and going along with the inclusion of this group of people or drawing from my western professional and academic practices of being open even if it was considered disrespectful. This action of mine was inconsistent with the value of cultural respect but emrged as vital for building trustworthy relationships in community based participatory research. In the end, I earned great respect from the entire group including the Chief himself.

5.2.4 Negotiating for participation

My fieldwork proceeded according to the terms of the indigenous people, western qualitative

approaches and my decisions. I had read about the importance of observing cultural protocols when doing fieldwork with indigenous people in their communities (Kovach, 2010a, 2010b; Lowan, 2012b), but I had underestimated their strong controls about whether to work with me or not, and when and how to work with me. I made this discovery upon my assumption of fieldwork which we wrote about in Mpofu, Mushayikwa et al. (2014a). I found myself negotiating participation and access through building and sustaining *ukuma,* observing the Tendera community terms of reference that included the cultural protocols for spiritual infolding (see how this *kupetera* protocol was done in section 4.4.3, p. 133). This extended my purposive "sampling" principles, as I had to first meet these indigenous cultural terms. Purposive sampling refers to

> decisions concerning the individuals to be included in the sample, based upon a variety of criteria which may include specialist knowledge of the research issue, or capacity and willingness to participate in the research (Oliver, 2006, p. 244).

It simply describes the researchers' sampling of participant decisions and actions based on the information-richness of the people, sites, and events in relation to the problem under study (Patton, 2002).

While operating within the principles of purposive negotiations for participation, I ended up working with both the key and the core participants whose participation I negotiated from two approaches. These are the western qualitative and indigenous research approach of gaining access into the field. I started with negotiations for key participation with my first visits at the Ministry of Education on 13 July 2012 for the purpose of applying for authority to do research in Zimbabwe. Thereafter, I progressed on an ad hoc basis with the incorporation of indigenous ways as they emerged. I based my negotiation for participation on professional contacts, referrals and ultimately on my own judgement of the group or person's knowledge of Chiweshe and, in particular, the Tendera community and its indigenous healing practices. This culminated into four main criteria used to negotiate for participation: official or community position, emerging incidences, participants' guidance/referral, and self- intuition.

Official or community authorities enabled me to identify people with key positions in the ministries and community. As in the Ministry of Education, I went in search of the officer in charge of authorisation for research. I was referred to Mrs Wamu who, after our discussion, referred me to Mr Nyathi who was in charge of the cultural section of the Ministry of

Education. She also advised me to seek approval from the Ministry of Land Development, citing that Elders and villages were under the auspices of this ministry. Having discovered the access challenges involved in this study, I sought assistance from experienced community researchers, Dr Sanga and Mr Zembe who separately advised me to seek the assistance of Chiefs and village heads. This led me to the Ministry of Land Development as we have reported in Mpofu, Mushayikwa et al. (2014a). Dr Sanga suggested ZINATHA whilst Mr Zembe suggested spiritual clearance. Mr Nkomo referred me to the Research Council of Zimbabwe, which I simply here refer to as the research council, as clearly stated in the authority Ministry of Land Development Mashonaland Central Provincial clearance letter (Appendix C-04). In turn, research council referred me to the Medical Research Council of Zimbabwe (medical research council) as stated in its letter (Appendix C-06). The medical research council finally accorded me authority to conduct research that involved a medical aspect in two phases (see Appendix C-07). This referral system of identifying and negotiating for participation is akin to the snowball or chain type of purposive sampling suggested by Patton (2002).

Through their participation, people in positions of authority guided and assisted me to identify and negotiate for additional participation. For example, the committee of leaders of Gomo advised on the *kupetera* cultural protocol with *ambuya* Tema, a spirit medium of *tateguru* Mukono whom the people of Tendera recognise as the spiritual custodian of their community. This led to her incorporation into the participation group. Mr Rusa, the link teacher of Gomo, recommended the participation of *sekuru* Kari. The Gomo school leadership committee concurred with this recommendation and he connected me to *sekuru* Kari. These link teachers also identified participating Forms (classes) after considering various school contextual factors, including curricula activities and timetabling within the Junior Certificate level focus. A major criterion these teachers considered was the availability of free lessons that could be used for the project. A free lesson in Zimbabwe is a period that learners are left to study or work on their own. Identification of a class was the first level of learner identification. In the second learner selection level, the link teacher and I gave learners in the class parental and learner information letters. These parental information letter s were written in Shona. The learners were given two weeks to bring back their parental and consent responses. This led to the third and final level of learner purposive selection. At this level, only learners who had given their consent and had parental consent were taken for participation.

As discussed above, the Chief council, committees of leaders and link teachers were instrumental in my selection of both key and core participants. They followed and modified my initial criteria for selecting each category of participants.

As I have already pointed out, identification of some healers and negotiating for their participation were done through observed critical incidences (critical incidences). These critical incidences helped me to identify three healers and negotiate their participation with them. Firstly, when I saw *ambuya* Soko in black and white cultural ceremonial dress passing through Deve School where I was holding a session with learners, my cultural background informed me that she was possibly a healer. I then asked the sessioning learners for her identity and location which Mr Chima, the link teacher, confirmed and he then negotiated with her for our first session. Secondly, the participation of *ambuya* Suma in this study followed Rudo's burning accident. Rudo is Mr Ngoro's daughter; he is a senior teacher at Deve School. I was told that Rudo was scalded by boiling water (see Figure 5-1 below) whilst doing domestic chores in their Harare residence, a two-hour drive from this school.



Figure 5-1: Rudo's scalded back

Preferring the indigenous healing of scalds to modern medicine treatment, Mr Ngoro went and fetched Rudo from a Harare hospital. He took her to *ambuya* Suma for treatment. On the

afternoon of 31 October 2013, I was in session with the learners of Deve when Mandi said "our medicine works. Right now Mr Ngoro's daughter came all the way form Harare where there are many hospitals to be treated for burns by *ambuya* Suma". We discussed more of *ambuya* Suma's healing practices. After the session, Mr Chima and I discussed the revelation of *ambuya* Suma. Together we planned the best way to approach her. Mr Chima (the link teacher) negotiated with *ambuya* Suma for her participation in the study on my behalf and we (Mr Chima and me) commenced sessions with *ambuya* Suma.

Thirdly, in our sessions, Ms Zivo revealed that Clara, a female senior learner at Gomo School, had been treated for a wound suspected of being cancerous by a male Kunatsa junior learner, also at Gomo. With the assistance of Mr Rusa, the link teacher, I negotiated for his participation. We followed up with both the parental and individual consent protocols. Kunatsa told me that he was under the mentorship of *sekuru* Moyo to learn to be an individual healer. *Sekuru* Moyo is married to his sister. With the help of Kunatsa, Mr Rusa and I negotiated for *sekuru* Moyo's participation in this study.

As I reported in Mpofu et al. (2014a), on rare occasions, my on intuition guided me to identify and negotiate for participation. In one case, an intuitive dream led me to Mr Choto whose guidance became important as I have discussed in Chapter Three (Excerpt 3-1, p. 86).

5.3 Ethically entering the fields

My use of fields here relates to the geographical location, the people and knowledge as framed within the nested fields model (Figure 3-1, p.81). I was careful to address ethical issues relating to these three fields throughout my fieldwork. I discuss my ethical access into these fields under the five themes that are discussed in the literature review and that emerged during the course of the fieldwork. The three ethical pillars – confidentiality, informed written consent and the withdrawal of participation rights – of doing western qualitative research (Bogdan, & Biklen, 2007; Guba, & Lincoln, 2005; Patton, 2002) directly pertain to the participants. The request to do research from organisations such as the ministries of education, health and land development, including schools, relate to a local or area field. The issue of intellectual property rights addresses ethics relating to the safeguarding of indigenous knowledge. The language of communication during fieldwork is an ethical issue that pervades all the three fields because, without adopting appropriate language, negotiation of access into these three fundamental fields of my study would have been futile. Lastly, my considerations of all these issues with the ultimate goal of doing research authentically in

order to produce trustworthy results guided me.

5.3.1 Research authorisations

In July 2012, I began my fieldwork by crossing the South African border into Zimbabwe. This marked the beginning of a continuous process that pervades this study. It extended beyond incorporating indigenous ways of accessing the location field, to the human and knowledge fields, and beyond ethical western qualitative research requirements. My first port of call was Ministry of Education. I anticipated a clear top to bottom authority clearance approach within this Education Ministry that I had experienced before in my previous Master's Degree level research. In conforming to the university's academic ethical requirements of doing research, I entered the Ministry of Education Head office located in the capital city of Harare with my entire research ethics dossier. This dossier comprised the ethical clearance granted by the Ethics Committee in Education of the Faculty of Humanities of Wits University (Appendix B), the application letter that informed the authorities about the research (Appendix D-01), adult consent forms (Appendix D-02) and minor participants' consent forms (Appendix D-03). Following the clearances from sessions with officers at this level, such as Mrs Wamu, my fieldwork branched into several routes in order to satisfy both western qualitative research approval and indigenous acceptance.

Mrs Wamu, the officer who handled my application to conduct research at the Ministry of Education Head office level, clearly indicated that the Ministry of Education's approval covered the schools, teachers and learners. The head office approval (Appendix C-01) referred me further to the Mashonaland Central Province. In turn, the provincial approval (Appendix C-02) directed me to the district (Appendix C-03) which finally directed me to the two schools, Deve and Gomo (Appendix D-05). Mrs Wamu also suggested that I got approval for villages and Elders from Ministry of Land Development. The approval from this Land Development Ministry of Mashonaland Province (Appendix C-04) referred me to the research council, which directed me to medical council (Appendix C-07) as was stated in the previous section. In order to work in the community of Tendera under the Ministry of Land Development district level of Chiweshe, I also obtained approval at this level (Appendix C-05). I was authorised to do this research in the health clinics of Deve and Gomo as authorised by Ministry of Health at the Mashonaland Provincial and Chiweshe District medical levels (Appendix C-08).

My sessions with the two academic researchers took me directly to Chief Tendera, the healers

and the ZINATHA healer organisation. These three wings, which are representative of indigenous ways of gaining access, were not in favour of written consent forms; they were content with giving oral consent. They emphasised that their word was sufficient and final. However, they (healer and Elders) eventually gave me their written consent towards the end of the fieldwork (Appendix D-02). I withheld the completed form to hide the identity of the participant. Mr Zembe emphasised the spiritual clearance which he initially assisted me with (see Mpofu, Mushayikwa, et al., 2014a). I could not insist on written authorisation; I had to consider the indigenous people's preferences and their ways of doing but, as it turned out, the required proof of clearance from the local government held.

5.3.2 Negotiating human access

Four ethical principles are usually observed when doing western qualitative research. These are: (1) anonymity, (2) confidentiality, (3) voluntary informed participation, and (4) the right to withdraw at any time (Malcolm et al., 2009). The Tendera indigenous ways of addressing ethical issues that emerged during the course of the fieldwork were parallel, and often contradictory to the classical (western) qualitative ethical access procedures. I therefore incorporated both approaches that are shown in Table 5-2 as the situation demanded.

Table 5-1: Classical vs. indigenous interpretive ethical research issues

Ethical issue	Classical	Indigenous
Identity	• Anonymous	• Disclosure
Consent	• Single aspect involving physical person individual (with parental in case of children) • Informed and written consent	• Four aspects: acceptance, protection, guidance, agreement • Informed, confirmed and verbal • Spiritual clearance
Withdrawal	• Individual right	• Community representative • Elder and spiritual consensus

(Adapted from Mpofu et al., 2014a, p. 172)

I adopted both written and oral forms of informing the participants about my study as driven by the situation. In doing this, I applied in three ways. I applied to the Ministry in writing and in English. The responses, as demonstrated by Appendix C, were all in English. Secondly, I employed concurrent or sequential written and oral communication to get research consent.

The concurrent approach was mainly applicable to individuals and groups within ministry contexts such as schools and clinics. The sequential approach, in which written communication was in Shona, followed verbal interactions or vice versa. With the assisted healers, it proved to be impossible to provide written information as my request to work in the Tendera community was more confirmatory than informing (see Mpofu et al., 2014a). This led to the third approach, that of verbal communication only through the three *matare* types I discuss in Chapter Four (p. 135). The delayed responses were also oral. As I have already alluded to in the preceding section, the healer and Elders were contend with verbal consent, but later gave written consent when they understood that it was a PhD qualification academic requirement.

The disclosure of identity expectations of Elders and healers I worked with concurred with the indigenous research literature I reviewed. Kovach (2010a) articulates that revealing the identity of indigenous participants is a gesture of respect and valuing of their contributions. In support of this observation, Malcolm et al. (2009) observed that it increased the participants' sense of belonging to the study. The legal and political implications of disclosing the identities of the participants are discussed in Chapter Three (see section 3.4, p. 91). I encountered problems when participants expected to be acknowledged by disclosure while this could create legal issues for the ZINATHA unregistered practitioners. As described in Chapter Three, I then decided to brainstorm this matter with my partners who agreed on the use of culturally symbolic names for the Elders, places and institutions. We derived these names from either totems or historical traditional events (see section 3.6, p. 108). I then learnt that this was a powerful way of enhancing good working partnership. I applied the same principle across all participants. Learners were excited by the use of their totems during sessions with them. However, because totems are shared rather than individual, we (learners and researcher) selected names in either English or Shona, which were meaningful to the learners. I realised, with fascination, that the learners named themselves after their close relatives or other names only known within their family set up like my Kutsigira name (see the section on "Who I am", p. 12). This reinforced their value of totemic relationships.

Despite the long period of time I did fieldwork in Tendera (February 2013 to April 2014), only five learners and two teachers dropped out (see Appendix A-01). Otherwise, I worked with all the other participants from the beginning of my fieldwork to the end. I attribute this positive development to the individual participation as representative and accountable to the community rather than as an individual right. As such, withdrawal of participation would

require Elder and spiritual consensus. I am of the conviction that such intentions would be regarded by the Elders and spirits as being disrespectful to the cultural norms and values, and will therefore lead to serious consequences. In addition, our relationship continued to grow through my following of advice, respect of the community protocols and participation in cultural activities such as funerals, and visiting the unwell even if they were not directly involved in my research.

In summary, my ethical access process proved to be a demanding and overwhelming task, particularly the indigenous part. It emerged that this was not to be a once off event that ended with the collection of the authority letter, as was the case with western qualitative research. Rather, it was a day-to-day activity from the beginning to the end. I describe my access process as multi-routed, networked and nested to reinforce the complexities of both the phenomena I studied and the process of research I engaged in.

5.3.3 Patterns of language

Three language patterns emerged from our contextualised conversations. These were dynamic, symbolic and register. Nilep (2006) also observes that talk in interaction is contextualised. Dynamic language describes how the use of language during the fieldwork fitted into an English to Shona or converse continuum. Throughout the fieldwork, our preliminary findings in Mpofu, Mushayikwa et al. (2014a) that speaking in English was oriented towards official communication, curriculum and academic issues, whilst Shona was oriented towards cultural issues, were reinforced. Participants spoke in English only in a very few instances, otherwise they spoke in Shona or code-switched. Code-switching means changing from English to Shona or the converse within the same session (Mpofu, Mushayikwa, et al., 2014a). The Shona used also took either a high or a low variety depending on the cultural issue under discussion and the people participating in the conversation. This diglossic nature of language is detailed in Chapter Three (see section 3 .2, p. 85). For example, mediums in trance of the spirits tended to speak in high ChiZezuru. But my being Karanga and my decision from the beginning to converse in ChiKaranga where ChiZezuru was the interactive dialect, brought with it linguistic limitations inherent in dialectical differences. My decision to stick to the use of Karanga was both an access and reciprocal strategy. As an access strategy, I needed the other participants to accept me as who I was which I established through the totemic introductions. Through our interactions, I gradually learnt ChiZezuru as much as the people I was interacting with learnt Karanga. This

up held the principle of reciprocity valued not only by the people of Tendera, but also by the indigenous people around the world as discussed in section 4.4.4 (p. 137) of Chapter Four.

The symbolic feature describes how we used metaphors, such as similes and nonverbal demonstrations, as way of solving linguistic barriers in addition to the link teachers' linguistic brokering. For example, I informed the mediums in trance of the spirit with which I intended to write the study. I described myself as *munyori* (a writer). In most cases, they failed to understand the language of the writer until I demonstrated it to them in writing. Having done so, they described me as *mumbarambadzi* (the one who writes) and the writing as *mbarambadzo*. This also facilitated my learning of ChiZezuru and the Tendera people's learning of Karanga. Our register naturally emerged from the totemic relationships we had established which I also adopted in this report. Such register included *ambuya* or *sekuru* in relation to healer participants. The use of *va-* interchangeably with Elder title or totems was used, for example, with Chief Tendera, Village head Shava, or VaGomo. The use of titles Mr/Ms/Mrs connotes the professional position or context of participation such as teachers, health practitioners and administrators. Addressing a participant just by name, for example, Clara shows his/her participation as a learner.

These language practices created relaxed, free and respectful interactions. The participants were enabled to express themselves freely in different ways including their own histories, stories, poems and songs. They also served as effective and vital tools for building and sustaining good relationships.

5.3.4 Intellectual property rights

In western rooted systems of knowledge production, intellectual property rights refer to the ownerships, protection of and gains from intellectual creativity (Mshana, 2002). In this respect, I first established how the Tendera people protected their wisdom from exploitation and then advised them on how this is done in academy.

I found out four main cultural secrets in which the indigenous people use to patent their knowledge. These are secrets (*tsindidzo*), taboos (*zviyera*), rituals (*mhiko*) and mysteries (*madzimudzangara*). Secrets imply keeping the knowledge in the heart; taboos are cultural laws (see Chapter Six section 6.2.3.5, p. 215); rituals are contractual agreements on conditional uses; and mysteries relate to the inability to conceptualise the way a particular plant has been medicinally efficated. All these cultural patenting approaches can be traced to

the indigenous people's belief in spiritual powers and wisdom custodianship. I also established that very few plants related to deeper specialised knowledge or were culturally protected through these patenting strategies. Otherwise, the majority of plants are known by all since they are considered to be a community property (Mpofu, Mushayikwa, et al., 2014a). I perceived such medicinal knowledge as free from cultural spiritual protection and therefore prone to commercial exploitation.

The participants, particularly the assisted healers, trusted me with both the common healing plants and the specialised healing plants as a family and community member (Mpofu, Mushayikwa, et al., 2014a). I have not only become a knowledgeable researcher, but a custodian of this community knowledge. My thorough reading of literature has revealed that most of the common plants known in this community are also known in other Zimbabwean indigenous communities and have been documented. I have no reason to hide the identities of such plants. As such, I reveal them in detail in the context of the findings. For those that appear to be unknown and not documented elsewhere, we (researcher and owner) agreed to hide their identities until such time they are patented in written form. In the spirit of reciprocity (see section 4.4.4 of Chapter Four), I had to educate my participants about the importance of western ways of patenting.

5.3.5 Striving for authenticity

The IAI methodology necessitated that I pursue the authenticity of my study through criteria that caters for both the western qualitative and indigenous components. The issues of authenticity or trustworthiness apply to rigour in the research process in order to produce valuable findings. Other research paradigms also employ rigorous evaluation criteria in their paradigms and methodologies. As a result, my first step towards the rigour of my study was to build a criteria framework commensurate with my IAI methodology. To do this, I drew aspects from the dependability, credibility, transferability and confirmability rigour criteria advanced by Lincoln and Guba (1985), Kvale's (1989) concept of communicative validity and Wilson's (2001) focus on all relations.

Kvale asserts that "validation" is built into the research process and defines validity as "the extent that a method investigates what it is intended to investigate" (Kvale, 1989, p. 74). He contends that validity involves ongoing checks, questioning, and theoretically interpreting the findings in order to make truth claims within a discourse. In addition, Kvale insists that what is valid (truth and value) in a discourse rests with members of the interpretive community.

The interpretive community relates to the participants of this study, that is, me and other participants as described in section 5.2 above. This principle of interpretive community is consistent with the collective value of the totemic methodology that I discussed in Chapter Four. In this study, all the participants constituted the interpretive community.

Authentic knowledge in indigenous research is generated through the researchers' answering to "all my relations" (Wilson, 2001, p. 177). This principle calls for the integral incorporation of the axiology or morals into the methodology to shape the researchers' conduct in a way that enables him or her to establish and sustain good working relationships (Wilson, 2001). In addressing "all my relations", one goes beyond just human relationships, to relationships with other elements of the environment inclusive of animals, spirits, earth and plants. Wilson argues that knowledge authenticity comes with how one fulfils the end of the research relationship. The relationships established do not end with the researcher-participant's exit from the field, but need to last well after the study has folded. Within this perspective, authenticity is evaluated by the extent to which the researcher establishes relationships in the community, relates to the spiritual aspect, the animals and plants of the community, and extends to community ways incorporated into the research process.

I applied both the communicative validity, and all my relations' authenticity within credibility and dependability criteria. Credibility establishes the plausibility extent of the research findings as grounded in and a correct interpretation of the data provided by participants (Guba, & Lincoln, 1989; Lincoln, & Guba, 1985). The collective and participatory nature of this study necessitated my use of member feedbacks, prolonged stays in the field, working with a broad range of participants who provided me with varied field experiences, being reflexive, journaling and member checking. All these are credibility strategies that are evident across the discussions of this study.

The dependability criteria relates to participants' involvement in analysis and interpretation of data, evaluation of findings and making recommendation as a way of making sure that all findings are based on the data provided by participants (Cohen et al., 2011). I am convinced that my detailed fieldwork including duration, choice of participants, where I conducted this study, how I ethically negotiated access, how we generated data, recorded and analysed it, makes my study auditable from the beginning to the end, hence authentic. I also discussed my research process and findings with other academics in different settings who were not part of the supervisory team. This process is described in the literature as peer examination (Guba, &

Lincoln, 1989). In checking myself against these criteria, I presented the central chapters of my study work in progress to different people and academics as listed in my acknowledgements (see my academic outputs listed in preliminaries to this study from page xvi). I also got many insights from such academic interactions that were instrumental in shaping this study.

5.4 My methods mix

Table 5-3 below summarises the forms of qualitative data that were generated in this study, their corresponding generation and capturing methods.

Table 5-2: Data type, generation and capturing methods

Generation methods		**Capturing method**	**Data type**
Main	**Sub**		
Personal experiences	Self-centred Interactive	Journaling (diarising)	Written
Observation	General Critical incidences	Video/audio recording Journaling Photography	Voice Written Image
Conversations	Interviews Talks Discussions	Video/audio recording Journaling Written responses	Voice Image Written
Objects	Documents Artefacts	Photocopying Collection Photography	Written Image

In this section, I provide a synopsis of these methods. More is said about how we (the participating team) used them to produce data adequacy in section 5.5 on generating the data below.

5.4.1 Personal experiences

I incorporated personal experiences method in this study to enable me to access data from myself that I needed to guide my decisions in the field. I did this in cognisance of experience as the foundation of social science inquiries (Clandinin, & Connelly, 1994). Actually, literature expresses the central role of the researcher's personal experiences in interpretive studies, indigenous and western. This literature show in various ways that these experiences

are indispensable in studies such as this one. Western interpretive research embraces subjective reality, multiple realities, and calls for researcher positioning, among others (see Bogdan & Biklen, 2007; Denzin & Lincoln, 2005; Patton, 2002). In particular reference to studies involving indigenous people and their knowledge within their indigenous communities, Khupe et al. (2013, p. 106) summarise it all by saying that who the researcher is matters.

During the entirety of the fieldwork, I regularly diarised my past and current self-centred and interactive personal experiences. By self-centred experiences I imply my personhood experiences that provide inward data for this study- the internal conditions of feelings, hopes, and reactions, moral dispositions (Clandinin & Connelly, 1994). Introspection means "the examination of one's own thoughts and feelings in knowledge production" (Dei, 2011, p. 9). I recollected and introspected intuitions (body talks, dreams and visions), backgrounds (my tri-sided background of home, academic and profession) and related memories. I also discussed with my family members past family events linked to my study. In addition, I diarised data I drew from my interactions with people other than participants and family members. This data accumulated from talking to, listening to and seeing people in action in all places (townships, public transport, staffrooms, etc.) within the field context. Clandinin and Connelly (1994) describe this focus of personal experience as outward, the context. Since I did not negotiate for their participation but their inputs contributed to fieldwork decisions, I embedded their words, actions and stories into my "interactive" personal experiences. So, the interactive personal experiences methods used specifically in this study, refers to the experience related to the study I gained from people other than the participants and myself.

5.4.2 Observations

Gray (2004, p. 238) describes observation as a "complex combination of sensation (sight, sound, touch, smell and even taste) and perception". It is therefore a function of the sensory system. As used here, observation alludes to sense catching incidents that occur during fieldwork interactions and within the fieldwork context (Mpofu, Mushayikwa, et al., 2014a, p. 167). As Table 5-2 above shows, I made general observations and observed critical incidences during my fieldwork. I recorded these data through either photographing/copying or video/audio- recording or diarising or a combination of these. The method(s) I used to record this observation data depended on place, type of session, event, participant consent as well as the duration of occurrence. I started by making general observations through my

contextual presence in different places (schools, homes, offices, caves and public transport) of the Tendera community. For example, in Chapter Three, I chronicled how I gathered initial contextual information on my first visit to the Tendera community through listening to the conversions of the people travelling on the same *kombi* (e.g. Excerpt 3-1, p. 86). This illustrates how general observations fed into my interactive personal experiences. These general observations also formed the foundation of critical incidences that I observed.

Flanagan described his critical incident technique as:

> A set of procedures for collecting direct observations of human behaviour in such a way as to facilitate their potential usefulness in solving practical problems (Flanagan, 1954, p. 327).

I adapted this observed critical incidences method from Flanagan (1954, p. 338) who explains that "an incident is critical if it makes a 'significant' contribution, either positively or negatively, to the general aim of the activity". I did not wholesomely adopt the critical incident technique. Instead, I borrowed the concept of critical incident and modified it to suit my purpose for its use. I called conspicuous events or utterances that provided useful leads for identifying healers, stimulated conversations and prompted further investigation, critical incidences. This is how I identified some of the healers as described in the previous section 5.2.2.2. It also led to the identification of some healing plants as explained in the ensuing section 1695.5 on how we used the methods to generate data.

5.4.3 Conversations

We (me and other participants) used three types of conversations to generate some data. These are interviews, talks and discussions. Their uses were based on place context (school, office, home), participation setting (individual or group) and IAI research component (indigenous or western).

Kvale (1996, p. 14) describes interview conversation as "an interchange of views between two or more people on a topic of mutual interest". Three main types of interviews are proposed in literature: structured, semi-structured, and unstructured (Patton, 2002). In professional contexts, such as schools, clinics and offices, data were generated mainly through open-ended unstructured interviews. Though the use of interviews in investigating cultural issues could be problematic, I considered them appropriate in view of the schooling and ministry context in which activities are timetabled. Institutionalised schooling itself is a

western concept that supports the use of interviews in such contexts. Moreover, those who have received a western rooted education find it more appropriate to generate data with interviews. I also used interviews with educators (Ministry officials and teachers) to generate data.

Some issues were followed up through informal conversations. Lee et al. (2012) describe this type of interview or conversation as spontaneously occurring at times with other partners involved in such a dialogue not being aware of an "interview" taking place. Issues under conversation may emerge from the immediate context, so the conversation is spontaneous, unplanned, free flowing and lacking time restrictions.

Talk methods are comparable to informal conversations. Talk (*nyaya*) methods are embodied in the every-day lives of community members and grounded in African indigenous oral traditions of knowing (Dei, 2010). They naturally occur and culminate in a variety of orality forms, such as singing, tales, incantations, instructions and storytelling. At other times, talks lead people involved into other activities. For example, many times we ended up in nearby bushes collecting plant species or with a healer demonstrating the treatment of ailments done in particular places of healing, including trees. The polychromous feature of talks combines with other data generating methods within a given period. For example, at times we talked as the healer was treating patients. This meant I also needed the consent of patient consent to observe their healing sessions. It is important to note that I originally had no intention of observing patients. However, this activity was introduced in two ways. In some instances this was critical incidence led as described in section 5.2.4 above. On other occasions the healers themselves initiated the involvement of patients. They invited me through either the link teachers or through their cell phones whenever they felt the healing sessions they were going to hold was of considerable value to this project. In both cases the healer took up the responsibility to negotiate and explain to the patients our (myself, the accompanying link teacher and/or the Elder) presence, the project and our partnership. At times this was done pre-session. Other times this done in session. In most cases the pre-session negotiations were reinforced by the in session explainations. Excerpt 5-1 below examplifies cases where healers neogiated with the patients for our prescence in their healing sessions prior to our arrival and reinforced it during our presence. In this excerpt, to the Mazara family who had come for an exorcism session, *ambuya* Soko said,

Excerpt 5-1: Healer negotiated for patient consent on my behalf

*Ava ndivo vandakakukura nezvavo masvondo apera kuti ndinoshanda navo. Iva varoorra vangu (*referring to me*) vanodzidza zekurapa kwedu saka vanoda kuvepo patinenge tichirapa varwere vedu vakaita semi*. These are the people I talked about some time ago that I am working with. This one (pointing at me) is my daughter-in-law who wishes to learn about our ChiZezuru ways of healing. So they want [to] see how I heal some of our patients, like you (Appendix A-01, 24 November, 2013, OCI).

Most of the participants consented to our presence and my use of the data generated in this project. I attributed this to the patients' respect and trust of the healers as well their priority of survival rather than worrying about the presence of other persons. This makes sense in view of my observation that most of the healing consultations and treatments were held in the presence of other patients. However, on rare occasions, some patients expressed discomfort caused by either our presence or the recording. We observed such reservations and accorded such patients the privacy as requested. For example, VaPosho, a male patient of about 35 years, who was being treated by *ambuya* Suma in one of our session, withdrew his consent the moment Mr Chima started video recording. He asked for privacy and the deletion of whatever had been recorded. We agreed and left until his treatment session was over. We were recalled to observe three more treatments sessions. Some talk sessions were organised in advance. Others were critical incident prompted. In both cases, they were individualised to group settings, therefore they were free flowing.

Data were also generated through two types of group discussions: *matare* and task based. *Matare,* as discussed before (see section 4.4.3, p. 135), is a group meeting involving community Elders solving or discussing specific community issues. Learners involved participated in groups through a method I identified as an individual-group-class (IGC) task based discussion. This was a self-discussion method that involved each participant responding to a set of questions or issues (tasks) and writing in his or her workbook as an individual (see Figure 5-7, p.177). These self-discussions were followed by group discussion, where learners the shared ideas in small groups of three to five members. Finally, a member of each group presented the shared ideas in total, stating which were commonly held ideas and those not known to others. I called this last level of discussion the whole class discussion.

5.4.4 Objects: Documents and artefacts.

Glaser and Strauss (1967) suggest that documents provide useful data in as much as participants do. I analysed two types of objects, documents and artefacts that were either self-generated by participants or used by participants. These included participant created documents and reference documents. S*ekuru* Kari's record of patients he treated exemplifies self-generated documents. The curriculum documents I collected are examples of reference documents that guide the teachers' classroom practices. Figure 4-2 (p. 134) shows some cultural symbols embodied in the spiritual infolding process that I analysed as artefacts. Observations, conversations and personal experiences informed me on the documents and artefacts I collected. In other words, like the healer participants, some of these objects were critical incident revealed. In some cases, I collected documents and either photocopied (e.g. healers'recordings as shown in Figure 5-5 below) or photographed them, particularly the cultural artefacts like those shown in Figure 4-2).

5.5 Generating the data

In this section, I discuss how I generated data with the different categories of participants (key, core, self) in different settings (group, individual) and contexts (home, school). Figure 5-2 below illustrates the course and structure of my data generation which interweaves the four data generation methods I have disussed above.

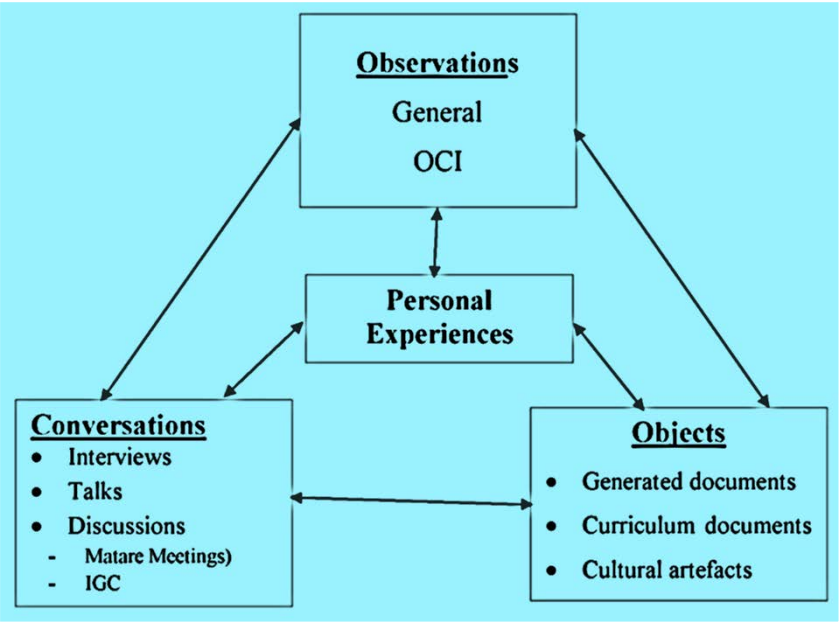


Figure 5-2: Data generation frame

5.5.1 Observations and conversations with healers and Elders

Data generation took place on an ongoing basis. My data generation in the Tendera community was generally based on my being accepted as a community and family member (Mpofu, Mushayikwa, et al., 2014a). As such, my visits were not defined as official sessions but rather as those of a relative coming back home. At times, sessions lasted the entire day but, at other times, they would last for twenty minutes or less. This depended on the session activities that were largely under the control of the healers and Elders. At other times, we would sit down and engage in family talks. In some instances, we either talked as we walked in bushes and mountains to identify the healing plants or as the healer was treating patiemce. In fact, all the Elders preferred these talks in their group set-ups or as individuals. I noticed that this was because, in conversations, Elders and healers enjoyed their cultural authority.

I stayed in Bindura, the capital city of Mashonaland Central Province during the entire period of data generation. It took approximately 1 hour 30 minutes to drive to the Tendera community from Bindura. Following my first contacts, the Elders or healers took it upon themselves the task of keeping in contact with me through a link teacher or cell phones for subsequent sessions. Elder here refers to a person who has a traditional leadership role in the Tendera community. These include members of the Chief's council**,** village headmen, and school development committee chairpersons**.** Healers are indigenous medicine practitioners within the community. The Elders and healers' possession of phones was convenient for me because I would phone the healers and Elders for any clarifications of issues that arose as I worked through the data. These Elders and healers were largely in control of the data generation activities.

The three video-recorded sessions with the Tendera Chief council were organised by Elder Munda. They took place in three different places: the home of Chief Tendera, the sacred cave of Shati and Zuva where the Chief Council presides over community issues. They lasted for 47, 90 and 130 minutes respectively. The sessions took the *dare* form of discussions that started with and closed by *kupetera* or *kuwombera* protocols. These cultural protocols are detailed in section 4.4.3 on epistemic perspectives (p. 133). My contributions were in response to issues emerging in the sessions from what I had seen and heard within the general scope of IKoPH and the participant's notions about its inclusion in schools (Appendix E). For example, on 28 February 2014, Chief Tendera led the spiritual infolding process session where many things were said and done in the sacred cave of Shati. A member of the Chief

Council got into a spiritual trance that led members of the Chief Council to disclose some plants used as sources of medicine that I felt they would not do if this had not happened.

The committee of leaders video-recorded sessions took place in the schoolyards under the shade of trees. They were organised by link teachers at village level. The link teachers vvideo-recorded these sessions. Like the Chief Council sessions, the committee of leaders' sessions took the *dare* discussion formats. They also started with and ended with cultural protocols. However, the wording differed depending on the village context, for instance, in Deve, the cultural protocols were in relation to the Deve ancestry. The same applied to the Gomo, where the Gomo ancestry was presented with the issues under discussion. I contributed to the discussion within the parameters of observation and conversation frame (Observation and conversation guide) provided in Appendix E.

Like the leadership committee sessions, healers' and individual Elders' sessions were mostly organised by link teachers. These sessions took place primarily in the participants' homes. Only one cleansing ceremony session with *ambuya* Soko took place on 24 December, 2013, in a natural river's sacred pool (see Figure 6-13d, p.232). The healers operated in different ways and their sessions were highly individualised. Our talk sessions were guided by the observation and conversation frame (Appendix E). At times, I recorded the data through videos and others through audio recordings. The link teachers assisted with the video-recording of some sessions and photographing some activities. In situations where I could not either document or audio record, I relied on diarising. In altered states, the talks were oriented towards listening and conforming to the spirits' sayings in relation to the issue at hand. These sessions ranged from 30 minutes to 240 minutes.

These sessions were driven by the situation and therefore varied in content, but issues were kept within observation and conversation frame (Appendix E). Some sessions were critical incidences stimulated whilst others were follow up sessions. I will draw on two cases to illustrate critical incidences informed sessions, the debarked tree and the treatment of burns.

On 12 February 2014, I observed a tree that was debarked on one side and I photographed it. Mr Chima, the Deve link teacher and I were walking through a bush from Deve School going to conduct a fourth session with *ambuya* Soko and her team at her homestead. *Ambuya* Soko is an assisted healer who works with an assistant and her husband as a mediator. Mr Chima identified the tree as *muremberembe* (Cassia abbreviate) but was not knowledgeable about its medicinal uses. I took a branch of this tree with me to the session. The homestead is about

500m away from the tree. After exchanging greetings, *ambuya* Soko started talking about the tree and its medicinal use before I asked about the tree. She confirmed Mr Chima's identification. This tree sample had stimulated her into talking about it and its medicinal uses. A group talk about this tree and its multiple medicinal uses emerged from this event. This, in turn, led to the disclosure of more medicinal plants. On this day, we ended up in the bush with *ambuya* Soko and her team showing me more plants. I had to operate with the frame of the observation and/or conversation (OBSCON) guide on the issues that I had planned for this session. The session lasted the whole afternoon from 14h00 to 18h00. The image of this tree is captured in Figure 5-3 below.304



Figure 5-3: Observed debarked tree

The other case that illustrates critical incidences informed sessions is how I identified *ambuya S*uma's individual healer participation and how it led to the first session is that of treatment of burns (see section 5.2.4, p. 152). I was privileged to observe her healing sessions. Healing sessions created opportunities for me to interact with patients with their consent. As I have explained in section 5.4.3 above, it was the healers themselves who

explained our presence to the patients. We (me, link teacher and/or accompanying Elder) also reinforced these negotiations and explanations as and when necessary. We talked as she treated her patients for different ailments.

Collectively, the healer sessions constituted three parts: talk (*hurukuro or nyaya*), doing (*kurapa*) and showing (*kurakidza madzinde*). Talk pervaded all the three parts. Each session would start and end with similar, but different cultural protocols. The doing sessions entailed the healing sessions themselves. The showing sessions involved bush excursions to identify the plants and explain how these plants are collected and used. In Figure 5-4 below, I was in one of the sessions being taught where to find the plants and how to identify them from similar species. Mr Chima took the photo.



Figure 5-4: Researcher on being shown a healing plant

There were times when the talks following observations stimulated narrations, storytelling, and singing within the same session or different sessions. At times, this happened even during the showing sessions. Some healers talked to the plants before talking about how to identify

them. In some cases, we sang during showing excursions. I slung my audio recorder around my neck during such excursions. I also wrote notes immediately after the excursion. When this happened, I celebrated inwardly, as I got the satisfaction of generating knowledge in an indigenous way (see Kovach, 2005, 2010a).

Through talks, some healers disclosed some of their self-generated artefacts. For example, Figure 5-5 below is part of a record of all the cases *sekuru* Kari treated he revealed in one of the sessions. *Sekuru* Kari is an individual healer who claims to have acquired his healing expertise through both western and indigenous modes. He revealed that his profession as tourist guide demanded a review of literature on plants that he triangulated with the indigenous oral methods he gained within the Tendera community where he grew up

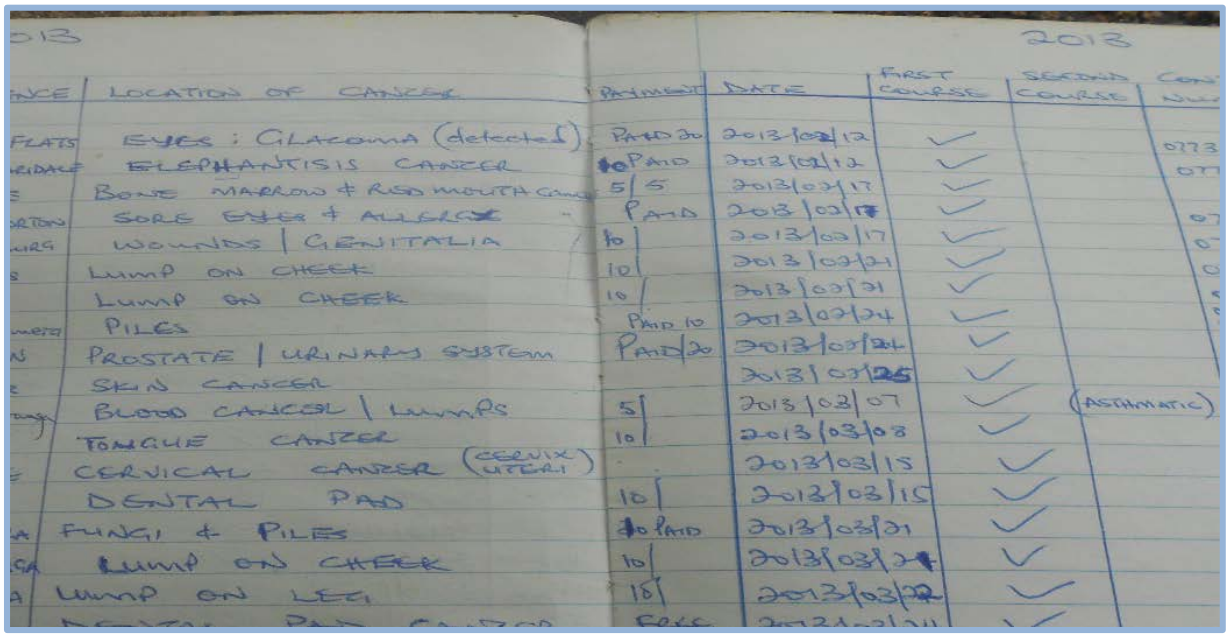


Figure 5-5: Sekuru Kari's record of treatments

My access to such records was mainly based on healers' consent rather on recorded patients' consent. This is justifiable in that such records were healer participant generated. My partnership with them [healers] was done from an insider perspective.This means that, as a partner, I was eligible to access to the healing trade information which my healing partners conidered fit to share with me and beneficial to the project. However, as repsponsibe researcher I upheld the ethical consideration of patient confidentiality and protection, by image "cropping" out identifying information such as names, contact addresses and cell phone numbers as shown in Figure 5.5 above. I used findings of my analysis of such records as the foundation for further talks about *sekuru* Kari's practices. Figure 5-5 further shows that

sekuru Kari specialises in the treatment of wounds. As we continued talking, s*ekuru* Kari disclosed that he takes images to monitor the progress of his healing treatments of open wounds. According to *sekuru* Kari he took, images 5.6(a) on the day he commenced treatment of this wound and 5.6(b) three weeks later.

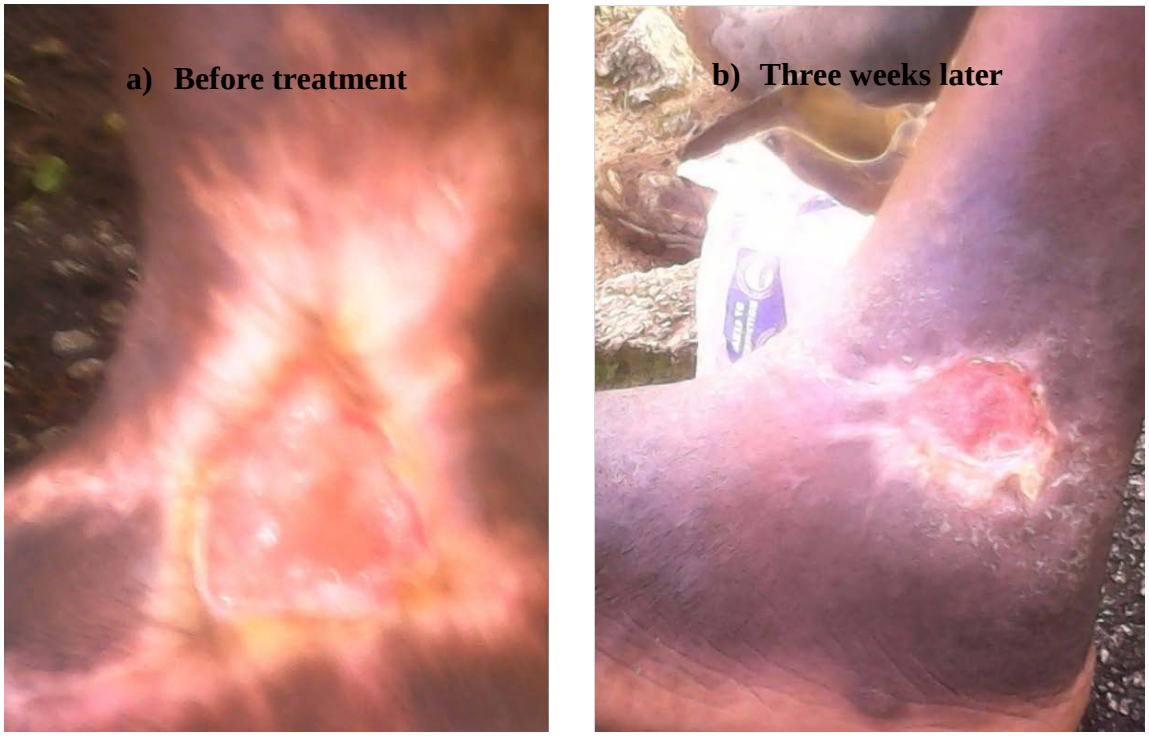


Figure 5-6: Wound images taken by Sekuru Kari

Another individual healer *Sekuru* Nzou also catalogued the plants he uses for treatment of different ailments. Unlike *sekuru* Kari, *sekuru* Nzou's record focussed on the product knowledge of the healing plants. That is, the ailment, the plant source of medicine and how it is prepared and applied (indomedicine). His records of tratments showed that sekuru Nzou was a general practitioners who deals with many ailments.

Besides being data themselves, both the documents and artefacts provided a basis for talking about otherwise sensitive issues Appendix E illustrates how conversations were structured upon the discovery of such objects.

5.5.2 Interviews and talks with working participants

The working participants included officers in the three ministries, academic researchers, health practitioners and teachers (see Appendix A-01). The duration of the interviews ranged from 20 minutes to 90 minutes, whilst that of talks ranged from 5 minutes to 15 minutes. The

teacher conversations were conducted in the schoolyard under a tree away from other people. Interviews with other participants were conducted in their work place offices. All these conversations were audio recorded with the written and/or oral consent of the participants. I abandoned the individual teacher and researcher discussion method as it was no longer compatible with the fieldwork frame that had emerged. The interview started with an introduction of the focus issue of the day. The talks were stimulated by emerging issues.

With the teachers, sometimes we engaged in talk prior to or after the interviews. I engaged in short talks with some key participants and interviewed others. Contrary to spontaneous talks, the staged conversations (interviews) were formally organised and time-tabled well in advance (Mpofu, Mushayikwa, et al., 2014a). I planned interviews with these participants. I focussed the non-teacher interviews through open-ended questions (Appendix E). The teacher interviews were individualised. As such, I developed interview topics as determined by the responses of the teachers and remained focussed with the OBSCON guiding frame (Appendix E). The sessions following the first interview session began by listening to the audio-records to provide a platform for reflection and to stimulate discussions of the session of the day.

5.5.3 Learner task based discussions

The learner IGC discussions were planned and conducted during normal lessons. In both Gomo and Deve schools, the two project lessons per week were timetabled. I prepared work sheet tasks (see sample in Appendix F-02). We made special arrangements for the lessons to be conducted in one day, one in the morning and the other one in the afternoon. The morning periods were 35 minutes whilst the afternoon periods were 70 minutes. I conducted a total of 27 discussion sessions per group (Appendix F-01). A 35-minute lesson period or 70-minute double period lesson was divided into three parts. As I have discussed in section 5.4.3 above (p.168), these were self-, group and whole class discussions.

This IGC discussion method fitted well within the everyday classroom activities and timetabled school context. It also accommodated individual differences, strengths and weaknesses by capturing individual thoughts which otherwise would not have been expressed in group sessions. I used the first lesson of each group to explain our working format. I also explained to the learners that there were no wrong answers in our work. I did this to empower the learners to respond freely to the tasks. I drew the tasks from many sources that included other participants, prior sessions and personal experiences. At the first and individual level of these discussions, each learner responded to the tasks in writing in her or his own workbook

as shown in Figure 5-7 below. The topics and tasks they discussed and responded to are indicated in Appendices F-01 and F-02 respectively. Learners in the second part discussed their responses in groups of three to five. I defined this phase as transitory from individualistic approach to sharing of ideas. At first, I distanced myself from the small group discussions. The idea was to develop learner's confidence to openly express their opinions. It also created space for learners to say aloud what they could not write. I realised that learners were very active in their small group discussions. Later on, I moved from group to group encouraging learners to express their ideas in different ways. This led to some students teaching us songs and/or volunteering to write songs, tell stories and fables (see Appendix H).

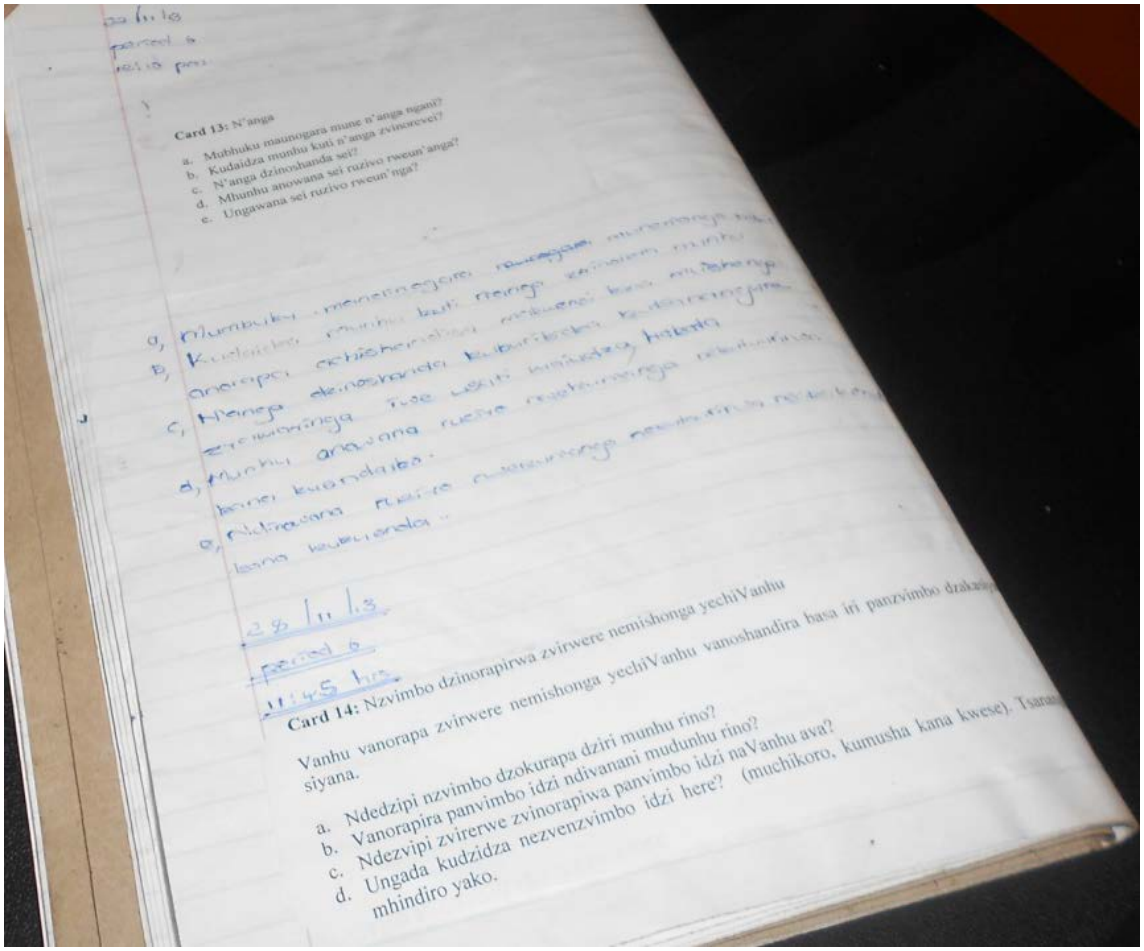


Figure 5-7: Example of tasks and learner responses

The last phase was the video-recorded whole class discussion. This was a report back, comments and question time. Each group reported back on their shared knowledge and views as well as their differences. They also responded to questions and comments.

5.5.4 Botanical identification

At times, participants physically identified plants they used for treating ailments. I collected representative plant specimens of such plants for identification and provision of botanic names at the Zimbabwe National Herbarium and Botanic Gardens in Harare. I was taught to botanically name the plants identified by ChiZezuru names from the Flora of Zimbabwe website[16]. For the plants that were only physically identified, where possible, I collected the entire plant, roots, stem and leaves for identification. But, in some instances, I collected only the terminal parts of the aerial shoots including leaves and reproductive parts (leaves, flowers, buds and fruits). As taught by the botanists, I tagged and coded the specimens. In the field, I kept the specimens in plastic bags out of the sun. I later pressed the plant specimens on a Plant Press. I laid the plant specimens in folded newspaper between layers of blotter and corrugated cardboard. The newspaper provides a folder for the plant. The paper and blotter draw the moisture away from the specimen. The cardboard allows air circulation within the press to speed up the drying process, and keeps the specimens flat. Plants in their newspaper folders were piled in layers, alternating padding and cardboard on the wooden frames. After I arranged all specimens on one of the wooden frames, I laid the second wooden frame on top of the pile and compressed them. I left the press to dry in a warm, dry place where air was circulating. After about 24 hours, I changed the paper and blotters in order to enhance the drying process. I took the dry specimens to the National herbarium for identification and provision of botanical names. I did all this with the consent of the participant who had shown me the plant. However, I had to leave out the identification of *sekuru* Moyo's *murapazvose (pseudonym)*[17] medicinal plant because he expressed discomfort about the western approach of collection and identification. The name expresses the mult-healing function of the plant.

5.5.5 Curriculum documents

I collected various curriculum documents for analysis in order to establish how the science in the curriculum spoke to the IKoPH which was emerging from the Tendera community. My

[16]Flora of Zimbabwe Utilities: List of species, vernacular names website is http://www.zimbabweflora.co.zw/speciesdata/utilities/utility-vernac-species.php

[17]Pseudonyms were used to hide the actual names of plants to protect the intellectual property rights of healers when it appeared that its use was unique to a particular healer and not been recorded in the literature before. We (me and the concerned healers) arrived at such names from the healers' descriptions of the healing behaviour of the plant.

search for these documents was guided by the curriculum framework shown in Figure 3-4 (p.105). These included: The Constitution of Zimbabwe (2013); Education Acts (1987, 1996); Nziramasanga report (1999); Science, Technology and Innovation policy; Cultural Policy (2012); ZJC science syllabus and the secretary's policies/circulars in the Ministry of Education.

5.6 Field exiting

In conformity with indigenous cultural protocols, I officially exited the field on 3 April 2014. This was done through a ceremony organised by an Elder that was held at Gomo School. All the Tendera participants were present. The ceremony started and closed with the indigenous cultural protocol of *kuombera* led by Headman Gomo. I reported on emerging findings. The participants responded to the report. They thanked me with traditional presents including a clay pot, a reed mat, and prepared indigenous medicines. They appreciated my working with them. Long lasting relationships beyond the projects were promised. This official exit ceremony did not mean that I stopped data generation or verification where needed. I went back to the field here and there to fill in gaps emerging from the data analysis.

5.7 Data processing

I qualitatively analysed data generated in this study shown in Table 5-2 above. Corbin and Strauss (2008) define qualitative analysis as "a process of examining and interpreting data in order to elicit meaning, gain understanding, and develop empirical knowledge". My data analysis aimed to (1) establish and document IKoPH of the Tendera community and its distribution within and across participating groups; (2) identify places in the ZJC science syllabus where IKoPH could be integrated; and (3) exemplify, from the data, possible ways of integrating this knowledge into the school curriculum.

5.7.1 "Kitic" analytic approach

The Culturally Aligning Classroom Science theory informed the development of the coding scheme that I then used to analyse all the data. Coding is a process pof developing codes from the data. A code is a descriptive "word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data" Saldaña (2013, p. 3). Codes are researcher-generated. They are partly analytical because they link various segments of texts to particular concepts (De Wet & Erasmus, 2005). A coding scheme therefore comprises lists of codes or labels (descriptors) that can be

assigned to data segments (words, phrases, sentences, paragraphs, all text) and the rules of applying them. The analysis took a kite shaped approach, where I derived its "kitic" name from and is shown in Figure 5-8 below.

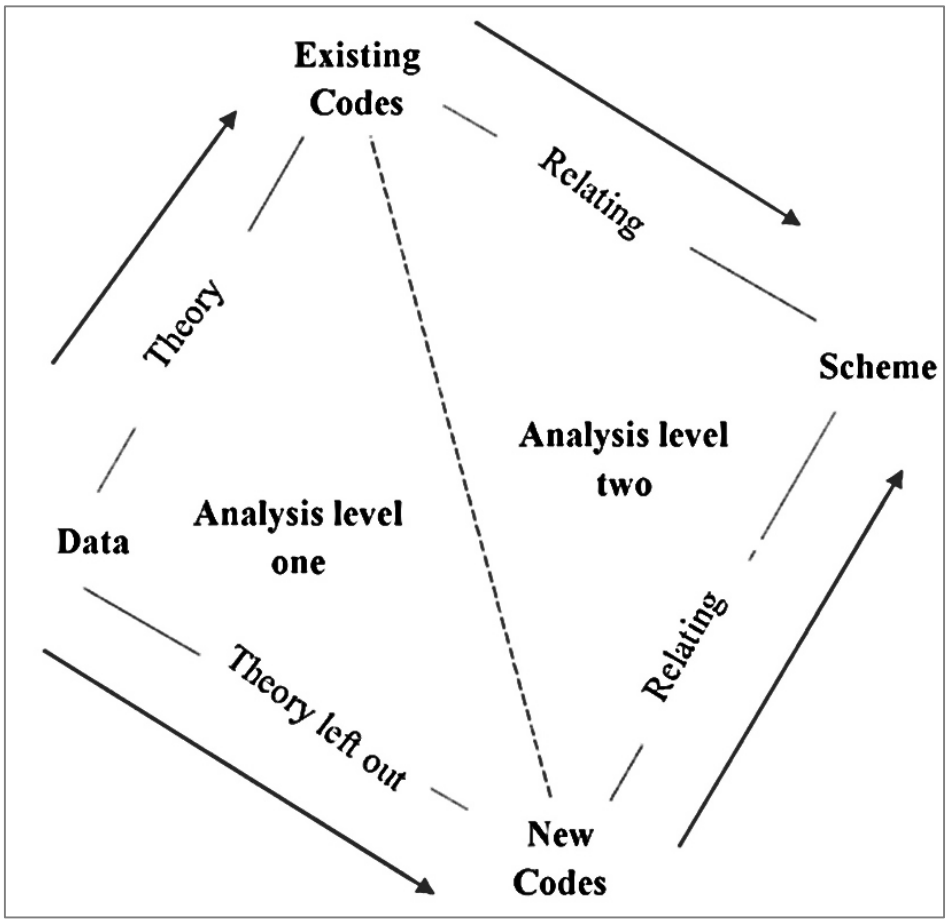


Figure 5-8: The kitic analytic approach

The two halves in Figure 5-8 above show the two-levelled approach I adopted. I started developing the coding scheme shortly after the first few data generation sessions. The whole process was an iteration of coding the data as it accumulated and revising the coding scheme. I used the three lenses of the CACS theoretical framework analytical tools to sort the data and search for its meanings. These are the Enterprise, Process, Paradigm and Product (E3P) model, the Purpose, Content and Pedagogy (PCP) classroom science and the divergent, convergent, parallel and substitutive (DCPS) integration or integrative model. Each of these lenses dimensionally describes a main construct of this study. Thus, the E3P describes indigenous knowledge of plant healing, the PCP describes classroom science, and DCPS describes integration. The three broad themes of data were predetermined by these three constructs and linked to the objectives of analysis. These are knowledge in Tendera, syllabus

places for IKoPH and its integration. The dimensions of the lenses that are looked through predetermined the sub-themes of each broad theme. In order to be specific, I identify the broad themes and their sub-themes as construct and theory themes respectively. Figure 5-9 shows the relationship between construct and theory themes.

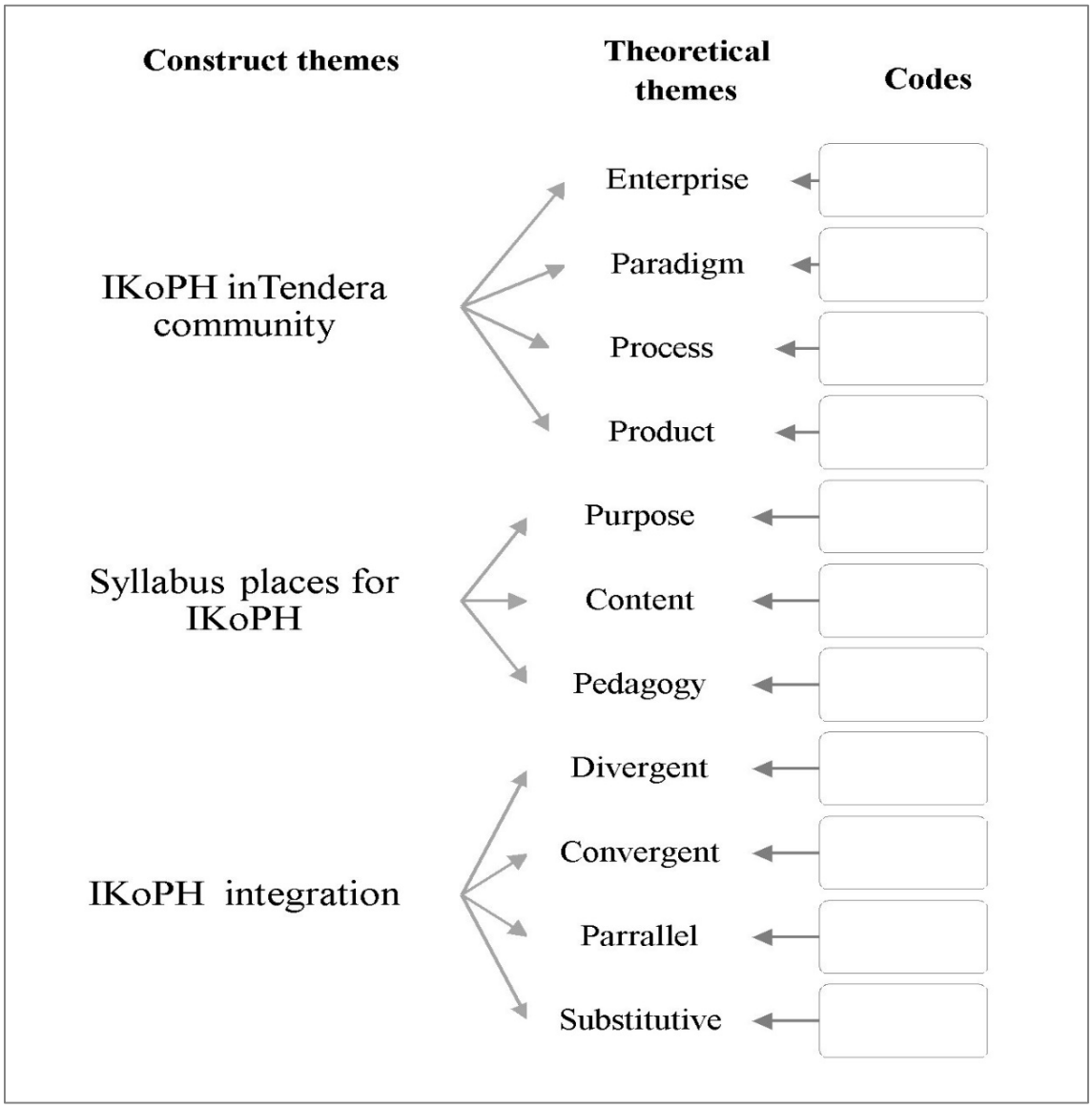


Figure 5-9: Theme and code relationships

The empty boxes show that I had to search for codes that could be related and clustered into each theoretical theme. The direction of the arrows from construct to theoretical themes shows a deductive approach to analysis in which broad themes were predetermined. They provided me with both working parameters and tools for initial organisations of data. The theoretical themes also functioned as data segment allocation to these themes but were not specific to the data generated. I achieved this through inductive reasoning, by which codes

that suggested the categories emerged from the data (Patton, 2002).

Using Table 5-3 whose data segments I draw from Excerpt 4.1(p.129) in Chapter Four, I illustrate how inductively interrogated data in three levels was arrived at.

5.7.1.1 First analysis level

I established codes or labels that spoke or suggested each theoretical theme as shown Table 5-3 below.

Table 5-3: Inductive data coding illustration

Data segment (What data is relevant?)	**Code** (What is it describing?)	**Theoretical Theme**
Shava mhofu yemukono	Totem identity	Paradigm
planning our families	Contraception method (family planning) Togetherness (our families)	Product Paradigm
Mambuya (Elderly women) told our wives and daughters	Expert women (mambuya) Telling (Told) Members dependence (mambuya, wives, daughters and husbands Collectivism (our)	Enterprise Query Paradigm Paradigm
Tell you, *unyanzvi nenjere dezvemadzinza zvinobva pasi kumadziteteguru*	Telling (tell you) Knowledge disseminator (*zvinobva pasi*) Knowledge/expertise source (whole sentence) Metaphor (*zvinobva pasi)*	Query Enterprise Paradigm Query
maoko ako akachena madzinza anokupa njere dzokurarama [3]*nemhuri*	Taboo or idiom (maoko akchena) Knowledge for survival (dzkerrarama) Doing for others (nemhuri) Ancestral spirit based expertise (madzinza anokupa)	Spiritual/ query paradigm Query Enterprise
Teteguru sings and we joined the singing	Ancestral spirit (tateguru) Collectivism (singing together) Cultural song (knowledge transfer)	Paradigm Paradigm Query
Do not eat what the baboon or bird does	Learns from observing nature	Process

not eat because you will die		query
We lived with animals in the bush	Community elements (whole sentence)	Paradigm
Baboons and birds are wiser than us…	Value of other elements (whole sentence)	Paradigm
Your ancestors open *makwara* (path) and your eyes	Spirit knowledge source (ancestors) Spiritual based knowing (makwara)	Paradigm or query
The session was held in hut specialised for consultations (surgery)	Place for healing	query

Early into my fieldwork, I assumed two overlapping analysis tasks. Due to the large volumes of data which were generated, most of the time I resorted to re-playing the audio and video records and analysing as I have demonstrated in Table 5-3 above. I wrote the data segment as is or summarised in the left column that described a unit of analysis. My unit of analysis implied a text expressed basic and codable idea (Minichiello, Aroni, Timewell, & Alexander, 1992). For example, the data portion "we were not planning our families" is a unit of analysis because it expresses an idea of indigenous contraception. I simultaneously assigned units of text to more than one category (Tesch, 1990). The bracketed words in the middle column show the focus of the reading of the data segment. I made the coding decision based on the focus word or phrase. Reading the same statement from an "our families" focus expresses the values of collectivism. This is both premised in the philosophy of *Unhu* and the totemic worldview, therefore, I classified it under the paradigm theme. Yet, when the coding focus of the same statement is on "planning family", the same unit of analysis fits into another product theoretical theme. I drew the codes I assigned to the data segments from the literature, data, and personal experiences. I continually referred to the literature with the Tendera context in mind. In the third column, I entered the theoretical theme that the assigned code fitted.

I also assumed data transcription whilst in the field. The task of transcription proved to be a daunting one. My transcription could not cope with the rate at which we generated data. So, my transcription of data continued into the post-field analysis phase. I primarily decided to transcribe the data myself for three reasons. Firstly, most of the data were in mixed Zezuru and Karanga; therefore it was going to be difficult for me to find a person proficient in combined language of the data. More importantly, self-transcription of data immersed me into it and kept me close to the context of events. Above all, it provided me with a

transcription level of analysis that complemented my audio/visual level of analysis whilst still in the field. The listening and re-listening of audio sessions, viewing and re-viewing of video sessions not only made me more familiar with the data, but also, as Lapadat and Lindsay (1999) assert, enhanced my understanding of data and the meaning derived from it. So, during fieldwork, I iterated between transcription, audio/video and objects analyses through this kitic analytic approach.

5.7.1.2 Second analysis level

Not all codes fitted immediately within the predetermined theoretical themes. I entered such codes into the theoretical theme column as "query" codes to describe the fact that they did not fit within the existing theory themes. As shown in Figure 5-9 above, this deductive-inductive analysis of data produced two sets of codes: the existing and the emerging (new). The existing codes fitted within and described the theoretical themes. The emerging codes fell outside the theory dimensions. At a stage when the query codes had accumulated and when the existing codes showed recurrence, I retrieved all the query categories, closely examined them and sorted them into groups that gave a collective meaning. For example, the codes telling, singing, knowledge transmission, learning from nature all expressed an oral knowledge transmission. This formed a new theoretical theme that I labelled pedagogy. I then examined these two sets of codes for possible linkages. The knowledge theme ended up with three additional theoretical themes: pedagogy, place and language. This is how, at this stage, key themes and frameworks for comprehension emerged. It expanded the E3P knowledge model to EL5P (enterprise, paradigm, process, place, product, and pedagogy and language) knowledge model. In order to conserve space, I named this level two of knowledge categories "hepta" (EL5P) knowledge dimensions from its seven dimensions. The themes reported in Chapter Six themes and frameworks for comprehension emerged from the third level of analysis. In relation to classroom science, this hepta knowledge model converted the PCP classroom science model into a holistic or ECL3P (enterprise, content, language, purpose, pedagogy and place) model.

5.7.1.3 Third analysis level

At this third level analysis, I explored the properties and dimensions of the construct themes, identified relationships between them, uncovered patterns, and tested themes against the full range of data (Bradley, 1993). How the themes emerged from the third level of analysis for each construct theme is demonstrated with the reporting of the related results in findings

Chapters Six, Seven and Eight. I continued coding with the generation of new data and adjusting (adding, rewording etc) my coding scheme in response to new themes and insights.

5.7.2 Post-field analysis

In the post-field analysis stage, I completed transcription and transcription based reflections. With all my data in hand- written form, I read and re-read the session by session text data, not to obtain the initial sense of issues raised in the data as de Wet and Erasmus (2005) did, but to revisit these issues. I crosschecked my diary reflections, refined my codes, and added some data segments to the lists that I may have missed during the infield analysis. I revised my coding schemes in accordance with the analysis objectives, hence the research questions. Data of most sessions were a mixture of different forms. For example, in one talk session, I ended up with conversation data, observation data, photographs and songs, among others. So, it was important to trace the data segments to their original sources. To do this, I developed a data source reference list (see Appendix H). I then coded all text as described above. Based on the coding scheme, the data gathered was organised into the three construct themes that turned out to inform my organisation of the findings chapters. The data source referencing allowed me to trace the segment back to its original source. It also brought together data segments within the same construct theme from all sets making it easier for me to relate the theoretical themes and identify emerging themes from these relationships. I consolidated the analysis, making sense of the data in the contexts of the Tendera community through the three levels.

5.8 Reporting on findings

My analysis transformed data into findings that I communicate in the next three chapters. Each chapter reports on findings of a construct theme. The sections of each chapter report on the themes that emerged from the third level of analysis. The headings of these are thematically presented according to the theoretical themes. I mainly use English as a reporting language because it is the reporting language for the research done in partial fulfilment of the Doctor of Philosophy degree, in the School of Education under the Faculty of Humanities of the University of the Witwatersrand. The writing provides text descriptions of each theme supported by descriptive statistics in terms of tables, charts and frequencies as well as photographs and excerpts from data to support arguments raised. In several examples cases the participants' words in the language in which they them communicated and their English translations are provided in parentheses.For example Excerpt 5-1 and Excerpt 8-26.

An example of an original transcript of data in the Shona language is given in Appendix J from which the yellow highlighted text has been drawn and English translated in Excerpt 6-11 and Excerpt 6-12 (p. 225). I analysed the data in the original language in which it was generated with the aim of preserving its originality that included metaphors, symbols and proverbs used by the participants. Most of the quotations from the participants used in the findings have been translated into English. I did this fully aware of the inter-language Shona to English translation limitations and of the possibilities of loss of original meaning. However, to minimise this limitation, I used literal translation to avoid misrepresenting data and to remain faithful to the essence of what was being communicated in the indigenous language of the participants. Further, I engaged an English-speaking person as a second language academic with Shona as his indigenous language to crosscheck the translations for me. The link teachers also checked the translation of sampled excerpts. However, it is always possible that I could have lost some useful meanings in the process of translation. Excerpt headings represent the codes of the data segments being used.

5.9 In conclusion

This meandering and crisscrossing fieldwork involved multiple activities and different categories of participants. It created spaces for multiple "voices" in the production of data and their analysis. It was conducted in a culturally sensitive way that catered for participants' individual differences and collective traits. Totemic relations built during the course of the study proved strong, culturally sensitive and ethical tools for negotiating entry in the community of Tendera and their knowledge. The incorporated indigenous ethical approaches surpassed university ethics requirements. In sum, I entered the community of Tendera with no answers to my research questions but exited it with, not only rich data to answer my questions, but also preliminary findings to these questions. In the next three chapters, I present and discuss the findings that emerged from this study.

6 CHAPTER SIX: KNOWLEDGE OF PLANT HEALING IN TENDERA

6.0 Introduction

I wish to begin by underlining the point that plant healing knowledge, which this chapter deals with, is a selected case to demonstrate how various types of indigenous knowledge might be generated by both teachers and researchers for classroom integration. Very often, when the subject of integration is raised, the question is: what indigenous knowledge is there for integration?" This chapter, therefore, is an attempt to address this frequently asked question. The chapter addresses the first research question: What accessible indigenous knowledge of plant healing (IKoPH) do participants hold? Whatever knowledge the participants hold needs to be documented for easy reference at integration with classroom science.

6.1 Tendera is a holistic community

Tendera participants' IKoPH is holistic and covers seven interrelated dimensions. These are enterprise, language, place, paradigm, process, product and pedagogy (EL5P or hepta knowledge). The Tendera participants' holistic concept of their community emerged from the interrelationships among these seven dimensions. These are discussed under the following three sub-themes: community membership, membership relatedness, and the human value of healing plants.

This hepta dimensional feature of IKoPH is captured in a poem I recorded from one of the participants, as follows:

Excerpt 6-1: *Unoziva*

A	**C**
Do you know? [1]	In it all, healers, elders[10],
This land, the land of our ancestors[2]	Not to forget us children[11],
Our cultural heritage[3],	Like bees we fight for our health[12]
A God-given gift[4] …?	Thank you our ancestors for this wisdom[13] …

B

Look out, look out[5]
See our forest and rivers [6],
Mountains and fields[7],
O-oh they flourish with plants[8]…
Plants that treat and protect us[9]

D

Life saviours our plants are[14],
From creation to death[15]
They protect us and treat diseases[16]
They balance us emotionally and [17]
Not to mention mentally, spiritually and sexually [18]
(Appendix A-01, 27 November, 2013, AOP)

I have labelled the poem stanzas A to D and superscripted statements 1 to 18, for easy referencing. In my discussion, I refer to each statement by a code that reflects the stanza letter and the statement number. For example, for statement "do you know" I refer the reader to line A1. This poem was recited by Kein, a male form two learner from Deve School. Kein was sixteen years of age at the time of the fieldwork during which he recited this poem. He said he had never left the community of Tendera. Kein's background makes me argue that what he is expressing in this poem *Unoziva* is the participants' shared meaning of the community, rather than his own individual conception. Kein voluntarily suggested reciting this poem following our learner discussion session 13 (see Appendix F-01).

Literally, the term *Unoziva* carries three meanings that depend on how one pronounces it. The sense in the translation "you know" implies common knowledge that the reciter expects to be known by every community person. The second translation, "you need to know", comes by way of reminding other people that the vital knowledge they ought to know is in existence in their community. The third, in question form, seeks to find out whether other community members are knowledgeable about the issues raised in the poem. My use of this poem is in the literal translation of this title as a question "do you know?" which I arrived at from the way Kein pronounced it in his recitation. It also connotes both awareness and the knowledge of healing with plants held in the community. People from outside the Tendera community, like myself, also gain knowledge of the community of Tendera and the people of Tendera through reading this poem.

I interpret this poem together with other forms of data in discussing the three sub-themes of the Tendera participants' sense of a holistic community that emerged.

6.1.1 Community membership

Documenting the participants' knowledge of community membership is relevant to our understanding of each of the seven dimension of IKoPH. This is because the hepta knowledge model guiding the understanding of this knowledge construct explains that each element of IKoPH is interrelated to the other six elements and is reflective of them. Data showed three categories of membership or elements existing in the community of Tendera: the human (people), non-human, and spirits. The expression, membership, connotes the participants' monist beliefs of every aspect in their community as spirited, therefore, alive or animate and related (see section 2.4.3, p. 59 for meaning of monist as used in this study). The participants talked and related to the spirits and plants as if they were talking to their human counterparts. For example, the healers chanted and/or sang to the plants. This affirms and exemplifies the general indigenous monist worldview that everything (animals, plants, humans, rocks, celestial bodies, natural forces, etc.) in the world is animate or alive (Battiste, & Henderson, 2000; Cajete, 2000; Kawagley, Norris-Tull, & Norris-Tull, 1998). This finding is further explored in section 6.2.3. The important point to note here is that membership animates all elements of the Tendera community. In contrast, the community element composition that provides a commodity and objective view of non-human aspects, such as plants, suggests that they are spiritless and a commodity to be used by mankind (Kawagley et al., 1998).

A commodity view of plants is held in western science which relates to power and dominion over nature (Aikenhead & Ogawa, 2007). This is detached from and conflicts with the monist view of indigenous people, which demands fundamental value of respect for all community members in order for humans to live in harmony with nature (Kawagley & Barnhardt, 1999). The commodity view of plants embraced by western science exposes the plants to exploitation and manipulation. This is because knowing, in western science, is largely concerned with "individual scientific credibility, corporate profits, medical advances, national security, economic progress, and knowledge for its own sake, among others" whereas indigenous knowing is "wisdom-in-action for survival" (Aikenhead & Ogawa, 2007, p. 582). Plants can be conserved from both the respect and commodity perspectives. I understand the phrase "we respect, therefore, preserve and protect" to express the indigenous people's conservation of plants from a respect perspective. The word "we" is a persona that reflects the principle of collectivism of the *Unhu* philosophy, and, more specifically, of the *ukama* of the Tendera people. In contrast, the commodity perspective of plants shows the western

science disposition of conservation that I sum up as “I gain, therefore, preserve and protect”. The pronoun “I”, reflects a personal and individual level whose use in knowledge production fits within the anthropocentric and individualistic nature of western science and technology (Tangwa, 2004). This comparative understanding is important to integrative classroom science because it provides us with examples of how different aspects of indigenous knowledge and western science intersect on a common phenomenon. The establishment of a common ground creates the third space for dialogue that is useful for bridging the epistemological gap that occurs when different paradigms intersect (Wallace, 2004). In this case, the conservation of plants is the common ground where the indigenous respect for and western sciences as commodity perspectives intersect. To achieve the integration goal of “double-visioning” (section 2.5.3, p. 68), learners, therefore, need to be taught both the indigenous knowledge and western science views underlying the conservation phenomenon. This is one example from which to understand the synergistic integration proposal (Barnhardt & Kawagley, 2005) which could be achieved through the side-by-side teaching of common concepts or phenomena from both the western science and indigenous knowledge perspectives, and is described by Mpofu, Otulaja and Mushayikwa (2014) as “parallel integration”.

The human members of the community of Tendera were drawn from the collective register recurrent in participants’ talks and actions. For example, collectivism was presented by the term “our”, the case of the possessive form that denotes people in general and oneself in relation to others. The Tendera participants also identified themselves in relation to their land. These findings are reflected and emphasised in the statement: “**This** land, the land of **our** ancestors” (Excerpt 6-11, line A2). The terms “this” and “our” in bold have been recited by Kein, a born and bred habitant of this community. As such, the terms “this” and “our” identify the land in question as the living space of the community of Tendera in the district of Chiweshe in Zimbabwe. Tendera people value their land because it basically provides them with living space and gives them a cultural identity as Zezuru people. This finding aligns with indigenous scholars’ (for example, Michell, 2005) observation that indigenous people value their land and view it as an indispensable source of life. It is not only a main life resource, but it also holds membership of all creation. The land is looked at as an environment where human community members build relationships among themselves, with spiritual and non-human members and, by so doing, accumulate lived experiences (Aikenhead & Ogawa, 2007; Cajete, 2000). This brings out a web of relationships that inform us on the nature of the

IKoPH in the community. It also explains the indigenous worldview of knowledge as place-based or locale, therefore, it is linked to the holistic sense of community.

Cajete succinctly puts the implication of the holistic community to the construction of indigenous knowledge, such as that of plant healing, as follows:

> All human development is predicated on our interaction with the soil, the air, the climate, the plants, and the animals of the places in which we live. The inner archetypes in a place formed the spiritually based ecological mind-set required to indigenous knowledge and science revisited establish and maintain a correct and sustainable relationship with place … But people make a place as much as a place makes them. Native people interacted with the places in which they lived for such a long time that their landscapes became reflections of their very souls (Cajete, 2000, p. 17)

Cajete, in the above citation, agrees with the participants of this study that the place, that is the land, is both a living space and a context of human interaction with other non-human members (soil, air, climate, plants and animals). He anchors life interactions within a place that shapes indigenous knowledge and the revisiting of the concept of science mind-sets on "inner archetypes of a place". I understand inner archetypes as the totality of all spiritual beliefs consciously or unconsciously held by people and how they influence people in a particular locality. This spiritual link provides a sense of place-based self-identities (Ermine, 1995). So, the people of Tendera identify themselves with their land of Tendera. Spiritualism reflects one world of the land or places, and therefore the community. This world carries many descriptors in the literature, including "inner archetypes" (Cajete, 2000), inner space (Ermine, 1995), and first world (Matsika, 2012). Kein's recitation of "this land, the land of our ancestors" (Excerpt 6-1, line A2), "a God given gift" (Excerpt 6-1, line A4), and "thank you our ancestors for this wisdom" (Excerpt 6-1, line C13) manifest the participants' beliefs in spiritualism and the spirits. These findings reinforce the *ChiVanhu* reality of the Tendera participants' totemic worldview that has been discussed in full in section 4.4 from p. 128.

In fact, during my fieldwork, the Elders and healers constantly referred to this spiritual world and referred to it in Shona as the *nyikadzimu*. For clarifying purposes, I will refer to this world as the spiritual world. The reference to land as a gift from God and ancestral wisdom of plant healing knowledge show the participants' common beliefs in guidance and control of this spiritual world. To them, their wellbeing and its restoration is under the patronage of the spiritual world of their community, which I refer to as the "spiritual community". This brings

to the fore the spiritual component of the community of Tendera, which is a paradigmatic dimension. On several occasions, Chief Tendera emphasised that "*Nyika iyi haisi yangu. Ine varidzi*", meaning: this land of Tendera is not mine, I lead this community on behalf of my forefathers (ancestral spirits), who were and are still the custodians of the land" (Appendix A-01, 28 February 2014, CT). By so doing, he was acknowledging and honouring the central role spiritualism played in their lives, particularly that of the plant healing system.

The land of Tendera forms the physical world where the human and non-human members exist. Other indigenous scholars describe it as the natural world, (see Aikenhead & Ogawa, 2007) or the outer space (Ermine, 1995), or the second world (Matsika, 2012). In relation to the community of Tendera, I refer to this world as the physical community. Kein, in the *Unoziva* poem above, identifies the non-human members of the physical community of Tendera as inclusive of the forest, the plants, mountains, rivers and fields (lines B6-8, Excerpt 6-1). The animal members of this physical community were referenced in other data sets. For example, in Excerpt 4-1, ancestral spirit Mukono, through *ambuya* Tema, said, "Baboons and birds are wiser than us" (p.129). The physical membership in the community of Tendera is embraced in Cajete's statement that "all human development is predicated on our interaction with the soil, the air, the climate, the plants, and the animals of the places in which we live". As I have already pointed out in the previous paragraph, data has shown the connectedness and dependence of the physical community to the spiritual one. This shows the embedding of the healing system with plants of the Tendera people in an African religious tradition. This finding concurs with literature that documents the observation that Africans are generally "in a constant relationship with spirit (God and ancestors) and in religious relations with other (community) entities, like plants and animals" (Matsika, 2012, p. 115).

The membership view and members' interdependence and interconnectedness in knowledge of healing with the production and uses of plants manifest "monist, holistic, relational and place-based" worldviews of indigenous people (Aikenhead & Ogawa, 2007, p. 582). The concepts of interdependence and interconnectedness are in contrast to the dualistic and reductionist western science construction of pharmaceutical uses of plants. Here a paradigmatic conflict between these two knowledge bodies, western science and indigenous knowledge, is revealed. Such an area of tension shows a binary opposition relationship of these two knowledge forms that makes the task of introducing the teaching of IKoPH into westernised classroom science difficult. If not resolved, such tensions threaten the successful integration of these two knowledge bodies at classroom level. However, this integration

threat could be converted into an integration opportunity from understanding that, in this modern world, the pharmaceutical uses of the plants are vital. We can start from observing that complementary medicine (see section 3.4, p. 93 for a detailed discussion of this medical approach) is already being advocated worldwide (Xue, 2008) and that the people of Tendera and other indigenous Africans have long been consumers of both western and indigenous medicine (Mpofu et al., 2014a).

Drugs used for managing health are products of western scientific reductionist and dual paradigmatically driven pharmaceutical processes. Such processes exemplify how western science has been extracting from indigenous knowledge systems. For example, the story of the Hoodia plant discussed in section 2.4.1 on page 52. But, putting aside the economic and academic benefits that come with such western scientific novelty, pharmaceutical drug processing provides humankind with medicine for managing its health. This reveals a human dependence and a connection to plants through the use of western science drugs. Simply put, human beings depend on plant processed drugs, hence, human health management is traceable to the plants.

The foregoing discussions led to a dual conception of "dependence and connection" of humans with plants within western science. That is, some humans depend on drugs for their health needs, some drugs are manufactured from indigenous plants, and, therefore, humans depend on plants for their health needs. This is comparable to interdependence and interconnection of indigenous knowledge. The difference lies with the type. In indigenous knowledge, it is an "inter" type that brings out its holistic nature whilst, in western science, it is "dual" because it also brings out the compartmentalised nature of western science. Such an in-depth understanding of, not only the relationships among the community members of Tendera, but also to both their knowledge of managing health and that western medicine informs us how to navigate such paradigmatic tensions and achieve meaningful integration. It illuminates the Enterprise, Paradigm, Process and Product (E3P) model's recommendation that the integration of indigenous knowledge with western science within classrooms should lead the understanding of both the nature of indigenous knowledge and western science (Mpofu, Otulaja, & Mushayikwa, 2014). Integration, from the differences between western science and indigenous knowledge, therefore, implies a search for connections between these two knowledge systems. In this case, dependence and connection is the desired link from which we can teach inter and dual types and their underlying differences. This promotes the side-by-side co-existence of these two forms of knowledge in classroom science.

6.1.2 Membership relatedness

Membership relatedness relates to the enterprise dimension of indigenous knowledge of plant healing (IKoPH). This dimension focusses on how the human community members relate to each other, to the spirits and the plants within the premises of IKoPH. Member relations underpin the development of knowledge of indomedicine (see footnote 4, p. **Error! Bookmark not defined.** to recall the meaning of this term) the participants hold as directed by their totemic worldview. Their understanding, therefore, draws our attention to the Tendera peoples' thinking behind the knowledge of indomedicine that we might otherwise fail to unveil with a mere focus on this product knowledge. Moreover, knowledge of member relations are most likely to inform us on how to deal with paradigmatic tensions arising from the western medicine and the indomedicine interpretations within classroom science settings.

As documented in the totemic worldview (section 4.3, p. 128), the participants saw every community member in relation to the other. Such relationships provide communal links expressed in terms of "all my relations" (see Hart, 2010; Kovach, 2010), which give sense of the interdependence and interconnectedness of the indigenous view of the world. In the world of Tendera, Chief Tendera underscored this membership relatedness within the health management with plants in the following Excerpt 6-2.

> **Excerpt 6-2:** Everything in the community is important to human health
>
> *Mwari ndewedu tese* (God is for us all). He provides each one of us with befitting wisdom for looking after self and others. You see a mother or the father attends to *dzihwa* (common ailments) to their children, our children know how to attend to minor injuries and whom to turn for complicated problems. Our healers are there for *zvirwere zvikuru* (complicated ailments)… *Maitiro aMwari anoshamisawo imi* (God's ways of doing is just amazing). He gives us everything … the plants, the animals, the rivers and soil (he looks pensive and points at one of the mountains near his homestead) ... in all these mountains lie our fore fathers, *inzvimbo dzinoera* (these are sacred places) [Appendix A-01, 21 December 2013, CT].

Chief Tendera, in the above excerpt, reinforces the human, non-human and spiritual membership of the community of Tendera. He shows that human management of health is connected to both the spirits and the non-human aspects, which are also related. This quote suggests that the human's wisdom of managing health comes directly from God.

The participants' holistic sense of community illuminated in the foregoing discussions

revealed a multifaceted community structure that extends beyond the physical into the spiritual, and in which these worlds reciprocally interact. In addition, a hierarchy of relations among the three types of membership emerged. This is apparent in Kein's order of reference to these community aspects. His reference to the land (physical world) as the "land of our ancestors, our cultural heritage, and a 'God given gift'" (Line A2-4, Excerpt 6-1) places God first, then ancestors and last the humans. This order agrees with the hierarchical relationships among the three types of *matare* that manifested within the people of Tendera's totemic worldview (see section 4.3.3, p. 135). In stanza B, he introduces the non-human beings (forest, rivers, vegetation, among others) of the community to show their lower level in relation to the humans in this hierarchy. This lower community level of non-human members of the community allows the Tendera people to refer to them as resources. Therefore, this hierarchy of relations connotes both authority over community resources (including plants and their healing knowledge of use) and custodianship. Both Chief Tendera (Excerpts 6-2) and ancestor Mukono (Excerpt 4-1) emphasised this hierarchical relationship. Furthermore, the cultural protocols I went through in my entire fieldwork connote this hierarchal relationship among the members of the Tendera community.

This hierarchy provides us with some insights into why the people of Tendera, and other Africans, worship their ancestral spirits. The participants regarded the plants as non-human beings of the community and, therefore, recognised those plants in as far as they medicinally served the people of Tendera. They held a shared belief that the plants are used by spirits to heal various ailments. This point is further elaborated in section 6.2.1 on spiritual wisdom below. That is why Kein thanked the ancestors for the wisdom of healing with plants (line C13, Excerpt 6-1 above). To the participants, the knowledge of healing with plants originates from their spiritual community that they greatly value. Despite the people of Tendera's view of plants as hierarchically lower than them, they say they were created by God. This holistic concept of the community does not only underscore the complex nature of IKoPH, but also the need of an in-depth documentation of all its aspects for classroom science. Failure to do so is likely to misrepresent the Tendera people's sense of a relevant science curriculum.

6.1.3 Human value of healing plants

The participants knew that their community was rich in plants. They medicinally used these plants and valued them for their healing efficacy. For example, *sekuru* Miti emphasised that "we here are still using our healing plants" (Appendix A-01, 03 December 2014, CT). In

Excerpt 6-2 above, Chief Tendera, also confirmed this when he said, "He (God) provides each one of us with befitting wisdom for looking after self and others … he gives us everything … the plants …" (Excerpt 6-2). Another example is captured in Excerpt 6-3 below in which *ambuya* Suma said,

> **Excerpt 6-3:** Plants are valued for their healing efficacy
>
> Every family in here, including *mapositori* (apostles), is aware of the ailments that we heal with our plants and … most of them are not curable *kuChirungu* (by western medicine) … All our plants heal but we know only a few … they are many (Appendix A-01, 08 November, 2013, CT).

Members of this community belonged to different Christian denominations. The Apostolic community is well known for being strongly against the use of healing plants grounded in the indigenous healing system. *Ambuya* Suma's emphasis on the *mapositori* also seeking indigenous healers' services reveals the strong value the people of Tendera accord to this healing system. At the same time, literature reveals that, in Zimbabwe, people seek healing services from either indigenous or Christian religious practices or both (Chavunduka, 2001; Mpofu et al., 2014a). The use of indigenous healing services of such people can be argued to be a strong indicator of the values they attach to such services.

Figure 6-1 below shows *ambuya* Suma treating village head Shava's daughter, Shamiso, of leg scalds caused by hot ashes. In fact, my data is rich on evidence supporting the fact that many families in the Tendera community value the use of plants for healing irrespective of their religious denomination. Such data include observations I made like the one pictured in Figure 6-1 above and the *Unoziva* poem praising God, ancestors and the plants. Songs, such as "*gombe mukomberanwa*" (coming or putting heads together to find solutions to problems) (Appendix A-01, March 21, 2014, AOS) and "*miti inozunguzika ichitipa upenyu*", meaning "trees swing to give us life" (Appendix F-01, March 21, 2014, AOS) all show the participants' strong value of plants as rooted in their health and survival functions.



Figure 6-1: *Ambuya* Suma treating leg scald with an indigenous powder

This survival function is linked to contemporary or modern (see footnote 6, p.1, for the use of these terms in this study) life that drives the purposes of developing, modifying, and gaining this knowledge form. This being the case, to an indigenous Tendera child, learning about managing contemporary life is desirable and motivating. In addition, learning about healing plants within classroom science needs to reflect the immense value and respect of this important knowledge by members of the community of Tendera. Such values manifest in the way the plants are harvested, chanted to, talked to and sung to as spirited members of the community. These findings show the cultural concept of the value of healing plants as spirited beings of the community and that their human counterparts depend on them for their health needs.

Values form the axiological aspect of a knowledge paradigm (see Figure 4-3, p. 137). Within the hepta frame of indigenous knowledge of healing, the paradigm guides the human

members of the enterprise (physical world) in the development, sharing and use of the knowledge of indomedicine. This makes this section relevant for establishing the links between the values and the indomedicine knowledge system of the participants. These connections and their extents lead us to the understanding of the breadth and depth of indomedicine as well as its intricacies arising from interactions with its components. Moreover, it gives us insights into what might count as relevant content for classroom science integration.

Participants in the Tendera community suggested that healing with indigenous plants is a diverse and complex knowledge area. The set of findings discussed in the next section show how diverse IKoPH is.

6.2 Knowledge of healing with plants

All the participants demonstrated their varying but substantial knowledge of healing with plants. These participants knew various plants that they collected from their Tendera locality for healing a wide range of ailments. Their knowledge of healing with these plants manifested in their healing practices and emerged to be tied to their holistic concept of the community. To these participants, the spiritual community is central to their management of health with plants and life in the physical community. This conclusion resonates well with the literature that documents the spiritual (ancestral spirit and the Great Spirit or God) centeredness of the African religion (Chavunduka, 2001).

Figure 6-2 below pictures these findings. The direction of the arrows (right to left) shows the participants' knowledge of healing with plants that emerged from the interplay between spiritualism, holistic healing and indomedicine (product knowledge).

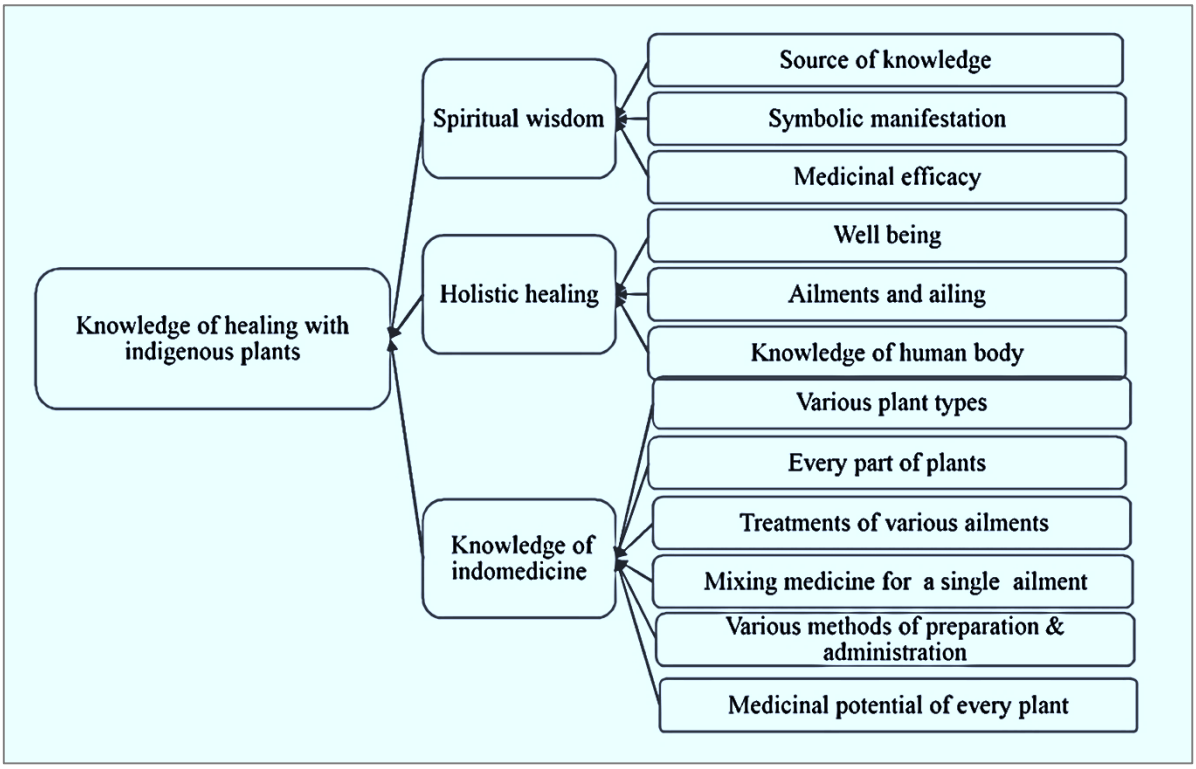


Figure 6-2: Knowledge of healing with plants: Levels and relationships

The themes of spiritual wisdom, holistic healing, and knowledge of indomedicine in Figure 6-2 above are elaborated in the following subsections.

6.2.1 Spiritual wisdom

The findings of the knowledge of indomedicine held by participants, and discussed in section 6.2.3 to follow, emerged to be premised on the participants' totemic worldview or paradigm. To the participants, the spirits are the foundation of their knowledge of healing with plants. Thus, focusing on indomedicine knowledge, does not only separate it from its spiritual fabric, but also constitute a misrepresentation of this knowledge body. For this reason, I considered it pertinent to include this section on spiritualism to illustrate how the participants brought out this paradigmatic aspect.

The participants believed in the existence of *midzimu* and *mashavi* (spirits of the dead, ancestral and alien), *njuzu* (supernatural water spirits or mermaids) and *Musiki/Nyadenga* (God or the Great Spirit). This is impressed in such data as "Thank you our ancestors for this wisdom" (*Unoziva*, line 14). The wisdom referred to here relates to the knowledge of plant use for healing. In fact, my data is rich in a variety of figurative or symbolic expressions that revealed their belief that spirits are the source of their knowledge of healing with plants.

Teachers and learners favoured the term *Chibhoyi* or *kurapwa nemishonga yeChibhoyi.* For example, Clara, a learner at Gomo School, said, "Kunatsa gave me *mushonga wechibhoyi* to treat the wound I had on top of my feet" (Appendix A-01, October 23, 2013, CI). This wound is now a scar on Clara's foot as shown in Figure 6-3 below.



Figure 6-3: Wound scar after *muti* treatment

These learners and teachers used the term *Chibhoyi* (Africanness) not in a way that reflected that this knowledge body is "backward" or "primitive", but rather it was used to express the healing system with plants in the Zezuru (African) religious traditions. Most Elders and healers used the expressions *kurapa nemishonga* or *muti wechiVanhu kana ChiZezuru.*

These findings were not new, but rather affirmed the general observation that indigenous Africans believe in spirituality and human relationships (Chavunduka, 2001; Mbiti, 1969). These findings reinforce the holistic concept of community that places spiritualism at the centre of the knowledge system of healing with plants. They also make the human

dependency on spiritualism for knowledge of managing health apparent. But, of what relevancy is this to classroom science? These findings suggest that classroom science needs to accommodate the teaching of spiritualism in order for it (westernised classroom science) to be meaningful to the children of Tendera. But this implication evokes a further question: What is it about spiritualism that could be used for the classroom? The metaphoric language such as Africanness is one aspect of spiritualism that can be taught. More aspects of spiritualism that can be taught in classrooms will be unveiled with progression of these findings discussions.

6.2.2 Holistic healing

The participants held three related types of knowledge that put together reflected their [participants] holistic frame of healing with plants. These are the knowledge of well-being, the knowledge of ailments and causes of ailing, and the knowledge of a person or human being. A detailed record of the knowledge of holistic healing is important because the knowledge of healing with plants is intricately linked to the community's concept of a person, what counts as ailing and an ailment as well as the sense of well-being. This is an important dimension of the knowledge of indomedicine because one cannot use the plant for healing an unknown ailment.

The participants held substantial knowledge of ailments that affected the health of people in their local community of Tendera. The participants' collective knowledge of ailments revealed fifty-seven (57) types of ailments that support Kein's recitation, "Like bees we fight for our health" (line C13, Excerpt 6-1). The metaphor "like bees" suggests that every Tendera person holds some knowledge of plant use for healing and applies it in managing one or more of the 57 ailments recorded in this study. In other words, each member contributes to managing these ailments. In Figure 6-4 below, I categorised these 57 ailments into body regions. The use of this picture was with the consent of the owner (see Appendix C-09).

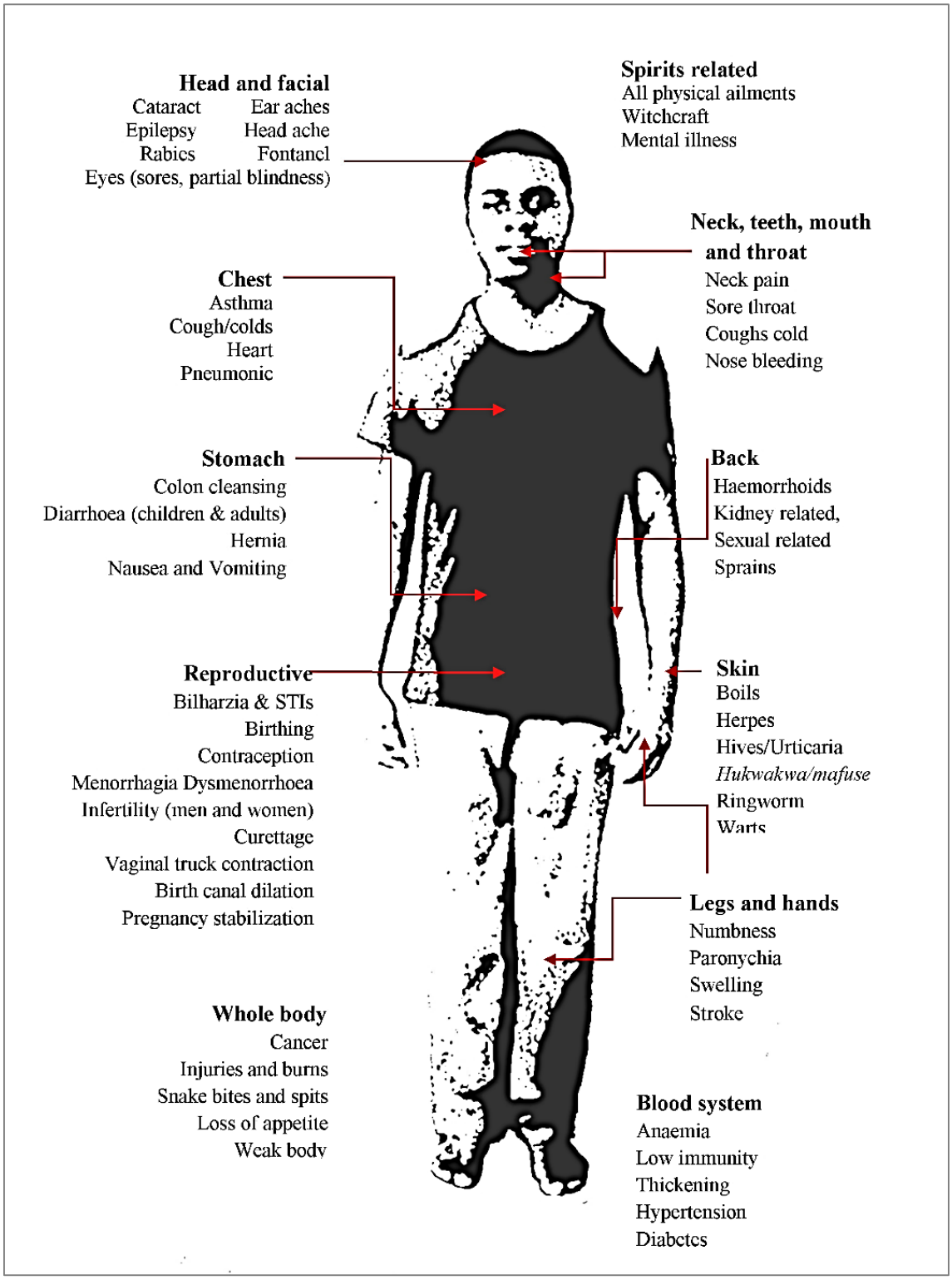


Figure 6-4: Ailments by body region (Author's original conception)

It can be drawn from Figure 6-4 that every part of the body from head to toe is prone to attack by one or more ailments. Moreover, these ailments were not only physical, but also spiritual. Thus, the Tendera participants' holistic conception of a human being or person is also depicted in Figure 6-4. This holistic conception of person describes the interplay between

pfungwa (mind), *muviri* (body), and *mweya* (soul or spirit*)* that define a person's well-being and ailing. This is brought out in the recitation that the plants "balance us emotionally and sexually, not to mention mentally and spiritually" (Line C17-18, Excerpt 6-1). Within this holistic frame of healing, both ailing and well-being extend beyond mere physical aspects into spiritual dimensions. The participants' knowledge of ailments (Figure 6-4), and, in turn, that of healing with plants (see section 6.2.3 below), embody each of these aspects of a person. In the following Excerpt 6-4, *sekuru* Miti illustrated that there is no knowledge of healing with plants that is isolated from the person and ailments. In fact, central to the knowledge of healing plants is the knowledge of a person and the ailments that the people of Tendera fight to maintain and to restore wellness.

Excerpt 6-4: Holistic healing interrelates community elements

> *Urwere nekurwara zvakadonha pano pasi* (Ailing and ailments dropped in this physical world) … same with witches and witchcrafting … God created *makwenzi* (healing plants) for *man'anga* (many healers) to use differently in dealing with these ailments (Appendix A-01, 3 December, 2013, CT).

The statement "same with witches and witchcraft" reveals a witchcraft category of ailing listed in Figure 6-4 above. Some of the figurative expressions participants used in reference to witchcraft caused ailments included *zvirwere zvekushereketa.* Other participants would talk directly about ailments caused by witchcraft such as *uroyiwa.* The participants brought out *kurohwa nezvinhu* or *zvishiri* (goblin attacks*)* and *zvikandwa* (mysterious insertion of objects into a person) as some methods of witchcraft. Chavunduka (2004) describes such ailments as abnormal, complicated and persistent. Participants also brought out ailments caused by ancestral and avenging (wandering or evil) spirits. They also expressed these figuratively, such as *zvirwere zvemhepo* (ailments caused by whirlwinds) or *zvirwere zvevhu* (ailments caused by the soil). The term *mhepo* expresses the intangible, invisible and mysterious characteristics of the spirit. That of *vhu* (soil) relates to the spirit of the dead person buried under the soil of the Tendera land, and the body that has become part of the soil. Both evil spirits and ancestral spirits' ailments are confirmed in the literature (Chavunduka, 2004; Mafimisebi & Oguntade, 2010; Manitowabi, & Shawande, 2013).

The participants, particularly the Elders and healers, used the terms *ane dzihwa* or *idzihwa* in reference to ailing related to physical ailments. The direct sense of *dzihwa* is coughing or flu related ailing. Metaphorically, this term means one is suffering from physical ailing caused

by *zvirwere zvemuvhu, mumvura* or *mumhepo* (ailments coming from soils, water and air). This simply expresses the natural causes of ailments. It agrees with the notion that, generally, Africans' acknowledge "that the air we breathe, the water we drink and the food we eat, are all swarming with millions of micro-organisms called germs" (Benedict, 2014). To most of the participants, natural ailments are inevitable because, as *ambuya* Suma says, "[z]*vakakodzera nokuti zvinosimbisa muviri*", meaning such ailments are inevitable because they strengthen the body (Appendix A-01, November 27, 2013, CT). The participants also tied natural ailments to accidents and immoral behaviour. They cited such accidents as burns, injuries from cattle horns, *kugumburwa* (trip over an object) and *kumarwa* (scratches), and snakebites as bound to naturally occur with the people's performance of daily chores. They attributed sexually transmitted infections, like HIV-AIDS, to immoral behaviour. Ironically, they all concurred that all natural ailments could be symptoms of spiritual causes. This shows that the knowledge system of ailing and ailments is a complex area of study. Since healing focuses on the whole person rather than one physical part of the body, it follows that combating such ailments and accessing such knowledge is bound to be equally complex.

The foregoing findings show that the Tendera participants not only subscribe to monism, but to dualism as well. As already discussed, their monist view extends to the spiritual realm. This explains their beliefs in spiritual causes of ailments. As such, they showed concerted efforts to prevent and treat such ailments using appropriate spiritual healing, such as exorcism, with plants. This will be covered in detail under section 6.2.3 below. Notably, the Tendera participants' hold a cause and effect dualistic interpretation of natural ailments and their treatments. They handle such ailments using the plants that exhibit natural medicinal efficacy which is explicable in concrete terms, unlike the spiritual treatment which remains mysterious as Matsika (2012, p. 92) says, "Africans use either monist or dualist interpretations of their life without experiencing any conflict". Aschwanden (1982, p. 308) also established the dualist and monist coexistence views within the Karanga people and said:

> the same Karanga who subscribes to monism views can almost in one breath adopt a purely dualistic idea. This does not mean they throw away their monism overboard, [but, rather] they allow the two systems to exist side by side.

This observation explains what Chavunduka (2001) means when he says:

> The African religion is a hospitable religion which accepts the fact that other religious systems may be equally valid, or even more so. The African religion is prepared to embrace other beliefs and practices as long as the necessary cultural adjustments are made. The African religion can therefore facilitate inter-religious dialogue (Chavunduka, 2001, p. 4).

This discovery that Africans, like the Tendera participants hold double monist and dualist worldviews is a relief to the integration of western science and indigenous knowledge problem, rooted in their paradigmatic tensions. This is because it opens up an integration window through the dual view common ground, which is natural ailments, their causes and medicinally active plants. In this regard, the monistic view can be treated as an additional layer to the narrow dualistic view. Integration at classroom science level then implies the teaching of ailing, wellbeing and healing plants from both monist and dualistic perspectives. In so doing, the indigenous knowledge and western science are allowed to co-exist as Chavunduka articulates above. Holding the monist and dualist worldviews together means the decision to be either dualistic or monist in interpretation is taken by the holder and is situationally driven. Thus, the task of integrators (researchers and teachers) is to understand the monist elements and dualistic elements and document them to pave the way for classroom practices.

The discussion of the above findings shows that indeed IKoPH is a complex system that can be easily misinterpreted and misrepresented because “westerners, and educational leaders trained in science know little about traditional African healing” (Hewson et al., 2009, p. 7). The importance of detailed documentation of this knowledge body is being underscored here. Documentation, as I have already argued, suggests topics and concepts for classroom. For example, the concept of types of ailments and causes of ailments could also be considered for inclusion in the science classroom under the main topic: “Health: Ailments and indomedicine”. The specific aspects of spiritualism that can be taught under the causes of ailments include metaphoric expressions and types of spirits such as ancestral, witchcraft and avenging. The participants also held plant knowledge for managing the ailments that is discussed the succeeding section.

6.2.3 Healing uses of plants

The participants held substantial knowledge of plant used for healing that emerged from five

knowledge levels. These were plant: (1) varieties (2) parts (3) healing functions (4) uses[18] and (5) medicinal efficacy (Figure 6-2). Each of these themes is discussed in detail below.

6.2.3.1 **Knowledge of plant varieties**

The participants revealed 115 plant varieties for healing uses (Appendix J). One hundred and three (103) of these plants were recorded with complete information and twelve (12) of them had incomplete information. Complete healing plant information identifies the plant by name or physical appearance, the ailment(s) it treats, the parts used, and the use or application of the indomedicine. The participants' provision of incomplete information about a healing plant was tied to both the oral mode by which the participants gained this knowledge and the cultural secrecy nature of this knowledge form. With regard to the oral mode of knowledge transfer, some participants tended to have forgotten some healing information specifics. In addition, other oral forms in which this knowledge has been archived, such as songs and stories, revealed general knowledge about healing plants. For instance, the *Unoziva* poem above provided insights into substantial knowledge of the existence of healing plants and their use by the participants. However, such general information did not give the identity of the plants, the ailments they treated, which parts are used and how they were used. It can be argued that the knowledge of plant use for healing is tied to the concept of cultural "secrecy". This concept was expressed in several ways that expanded the notion of cultural secrecy I had initially obtained as discussed in section 5.3.4 (p.161) and recorded in Excerpt 6-5 below:

Excerpt 6-5: Cultural secrecy

> Information released in a moment of trance is difficult to probe. An attempt to do so is frustrating as the mediums are portraying ignorance of the conversation. Most of the times their assistants refer me back to the spirits. The spirits change subject of discussion as they wish (Appendix A-01, December 14, 2013).

The above quote reveals not only the participants' knowledge of preserving and conserving knowledge, but also unveiled the complexity of its access. It is quite probable that cultural secrecy is a way of knowledge patenting. All the participants were knowledgeable about the secretive nature of this knowledge body and the associated access challenges. This denotes that the knowledge of plant use documented in Appendix J is not exhaustive. Rather, it only reveals the participants' knowledge that they voluntarily shared with me. However, I found this recorded knowledge adequate to reveal the nature of the IKoPH in Tendera, and to use it

[18] The expression "healing plants" means the preparation and administration of indomedicine.

in illustrating how it could be integrated into classroom science.

Ninety-two (92.2 %) plants of the 103 that were documented with complete information were indigenous to the Tendera community, and therefore, Zimbabwe. The remainder, 7.8%, were exotic trees planted in homesteads and gardens. These exotic plants were mainly revealed by learner participants. These learners regarded the uses for healing of these exotic plants as indigenous as they were used in the same manner as indigenous plants. One individual healer, *sekuru* Nzou, concurred with the learners on the use of exotic plants for healing. However, he was very clear about the difference between the two, but acknowledged the benefits of complementary knowledge of healing. Otherwise, the Elders and healers regarded the exotic plant use as non-indigenous. They argued that they were not resources given by ancestral spirits and therefore their uses suggested a lack of understanding of the indigenous holistic frame of healing.

The participants held knowledge of growth habits of a variety of plants for healing. Within a botanical perspective, growth habit relates to the plant's appearance, shape and growth characteristics. Figure 6-5 below depicts that ninety-one per cent (91%) of the 103 plant sources of indomedicine were herbs, trees and shrubs. The medicine prepared from climbers, flowers, grass and vegetables constituted the other 9%. The percentage composition was calculated by dividing the number of plant species within a growth habit category with the total of 103 plants recorded. For example, the percentage composition of plants with growth habits under the other category was equal to 8 of 103 multiplied by 100.

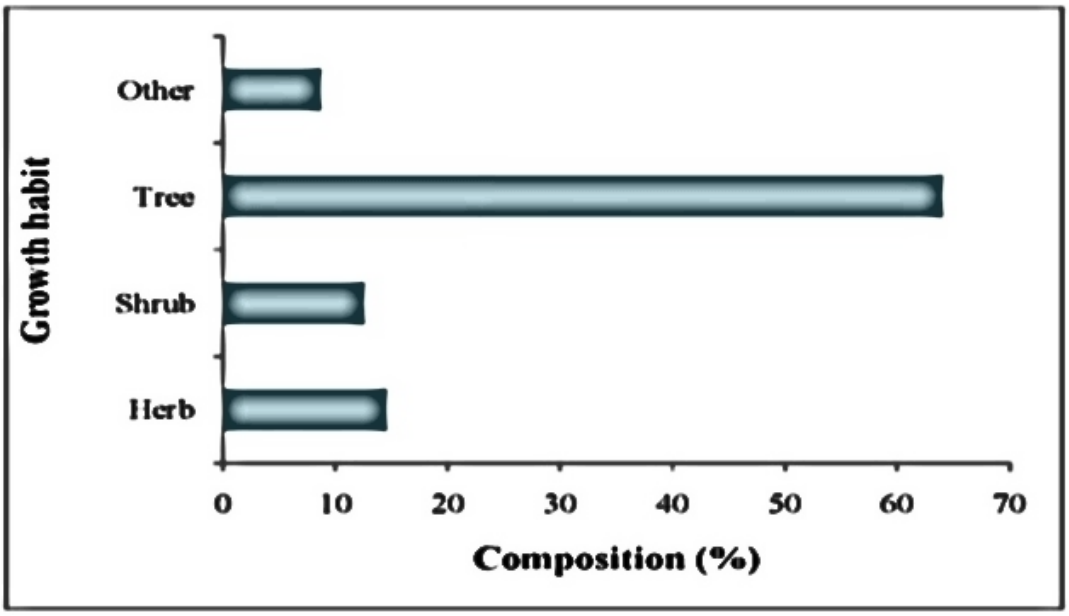


Figure 6-5: Growth habit

These growth habit patterns are similar to the findings of related studies conducted in other rural areas in Zimbabwe (Maroyi, 2011, 2013). According to Maroyi (2011), the common use of trees and shrubs as sources of medicine could be attributable to the variation effect on the growth of plant by seasons. Trees and shrubs are resistant to drought and are available almost year round. However, this study revealed that this could only be one reason among many others.

The medicinal uses of these plants could also be attributed to differentiated knowledge of each plant use and the knowledge of its place of habitation. For example, *ambuya* Suma demonstrated individual knowledge of healing cancer using the roots of the herb *mukundamhuka*- a pseudonym of this healing plant see footnote 17, (p.178) for the reasons of using pseudonayms for some healing plants and how these names were arrived at-and its place of habitation in the community of Tendera. The part of this plant above ground dries up in winter but, due to her knowledge of its place of habitation, *ambuya* Suma collected it at any time of the year. Likewise, *sekuru* Miti demonstrated a clear knowledge of the place of habitation of the *mukwezvanyoka* (pseudonym- see how *sekuru* Miti describes this plant as poison that treats on page 218) flower he uses for snakebites. *Sekuru* Miti claimed as recorded in Excerpt 6-6 below.

> **Excerpt 6-6:** Knowledge preserved to the knowledgeable
>
> *Gwenzi rangu iri rakabva pasi kuma dzitateguru edu* (This healing plant of mine is from as far back as our forefathers)…It is not community knowledge but is our, the Dube knowledge…we do not just disclose this knowledge as it is important … in case of emergency, I am guided by *tateguru* Dube to collect it (Appendix A-01, December 3, 2013, CT).

The expression "this healing plant of mine …" implies the knowledge of the plant use as personal knowledge. In the excerpt above, *sekuru* Miti illustrated the different healing functions of plants and their habitation. The Zebra (*Dube*) family ownership level of the healing knowledge (function, place of habitation, etc.) that is linked to the *mukwezvanyoka* can be inferred from the above Excerpt 6-6. On the other hand, the personal level of ownership of the *mukundamhuka* cancer treating plant of *ambuya* Suma was apparent. Plants used for managing most common or physical ailments, such as flu or bilharzia, emerged as communal knowledge. Logically, communal knowledge is easier to access than individual and family owned knowledge. This is because, at communal level, the totemic principles

relate to this knowledge as a basic need for survival. Therefore, every person has the right to access this knowledge. Of importance to integration is the individual level knowledge ownership that is common to both western science and IKoPH as this creates space for teaching about the broader aspects of community and family level of knowledge within indigenous societies for reasons I have already put forward in preceding sections.

6.2.3.2 **Parts of plants used**

The participants also collectively held the knowledge of plant parts processed into medicine whose variations are shown in Figure 6-6 below.

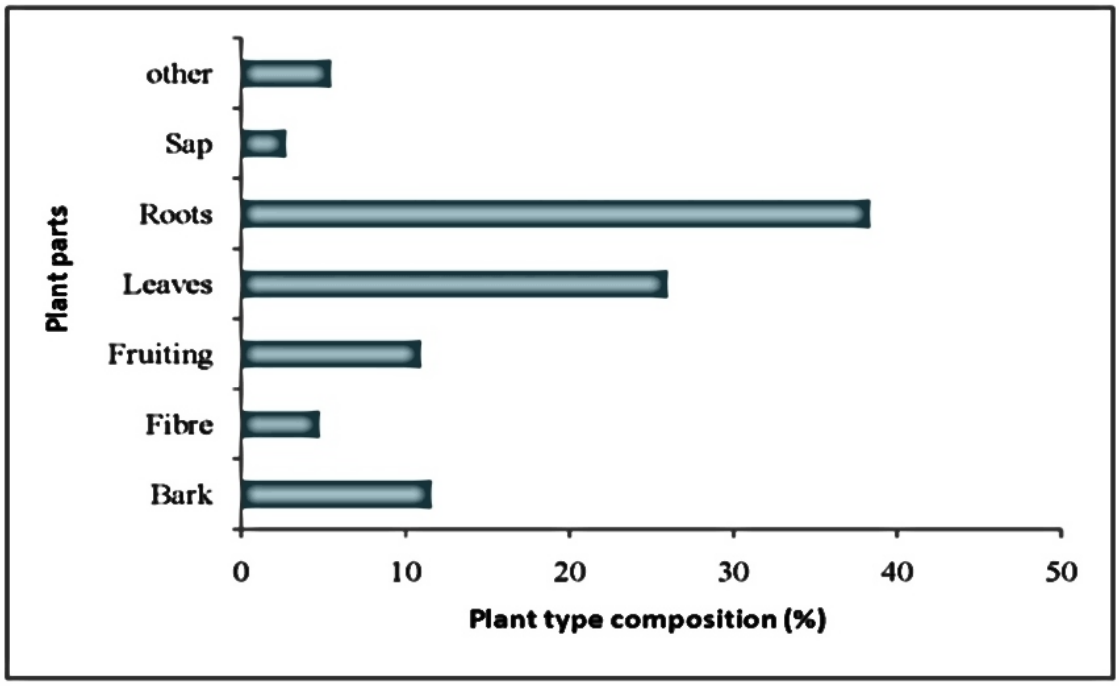


Figure 6-6: Variation of healing plants by parts used

Figure 6-6 denotes that all the parts of a plant (barks, fibre, leaves, roots, sap, fruiting parts, flower, pod fruits, and seeds) were prepared for indomedicine. The plant parts forming the other category were parasites, branches, stem and whole plant (see Appendix J: Record of healing plant and ailments). It further shows roots as common sources of indomedicine. Again, this finding agrees with Maroyi's (2011) ethnobotanical survey of medicinal plants used by the Karanga people in Nhema rural area in Zimbabwe. Kunwar, Nepal, Kshhetri, Rai and Bussmann (2006) scientifically interpreted the common use of root indomedicine. They say the underground conditions provide favourable conditions for concentrations of bioactive substances that make the roots more medicinally efficient. Probably this explanation applies within the Tendera participants' dualist views. The participants, however, did not offer any

explanations (why knowledge) to their common use of root medicine. Instead the Elders and healers would merely say, "*Zvakavamba zvakadaro*" (it has always been like this). The teachers and learners would just say, "I do not know" and "such knowledge cannot be questioned". These answers present a mystery that manifests in a monist worldview.

In the above discussion, I can argue that the "knower" knows the "what", "how" and the "why", knowledge of using root medicine, but only sees the importance of passing on the practical (what and how) to the knowee. This resonates well with the functional purpose of knowing this knowledge. In gaining knowledge for use and sustaining life, the effectiveness of the knowledge for its intended purpose is what is of importance, rather than explanations. Zezuru people, like any other group of indigenous people, venerate mysterious knowledge. This is why non-disclosure can also be viewed as creating space for inexplicable or mysterious healing practices, such as healing rituals. For instance, many aspects of exorcism, such as I observed being performed by *ambuya* Soko, are "I can see but I do not understand" type. Explanation disclosure can be viewed as accommodating the mysterious aspect of plant healing practices that conforms to the indigenous view of living in harmony with nature. Within this worldview, coexistence with the mysteries of nature is upheld and viewed as a tool to achieve "harmony within the web of interrelationships for the purpose of survival" (Aikenhead, & Ogawa, 2007, p. 559). This has consequences for classroom science interaction where integrators need to respect the indigenous people's zone of disclosures and concealment of their knowledge to other people.

6.2.3.3 **Knowledge of plant healing function**

The participants also held knowledge of plant healing functions. This knowledge of treating ailments using indomedicine emerged in four categories. These are knowledge of: (1) ailments treated; (2) ailments treated with medicine prepared from different plant species; (3) different ailments treated with plant medicine prepared from the same plant species; and (4) single ailments treated with medicine prepared by combining different plant species (concoction medicine).

Figure 6-7 below summarises the analysis of plants recorded in Appendix J by the number of ailments they treat. It shows the knowledge of ailments treated by medicine prepared from plants.

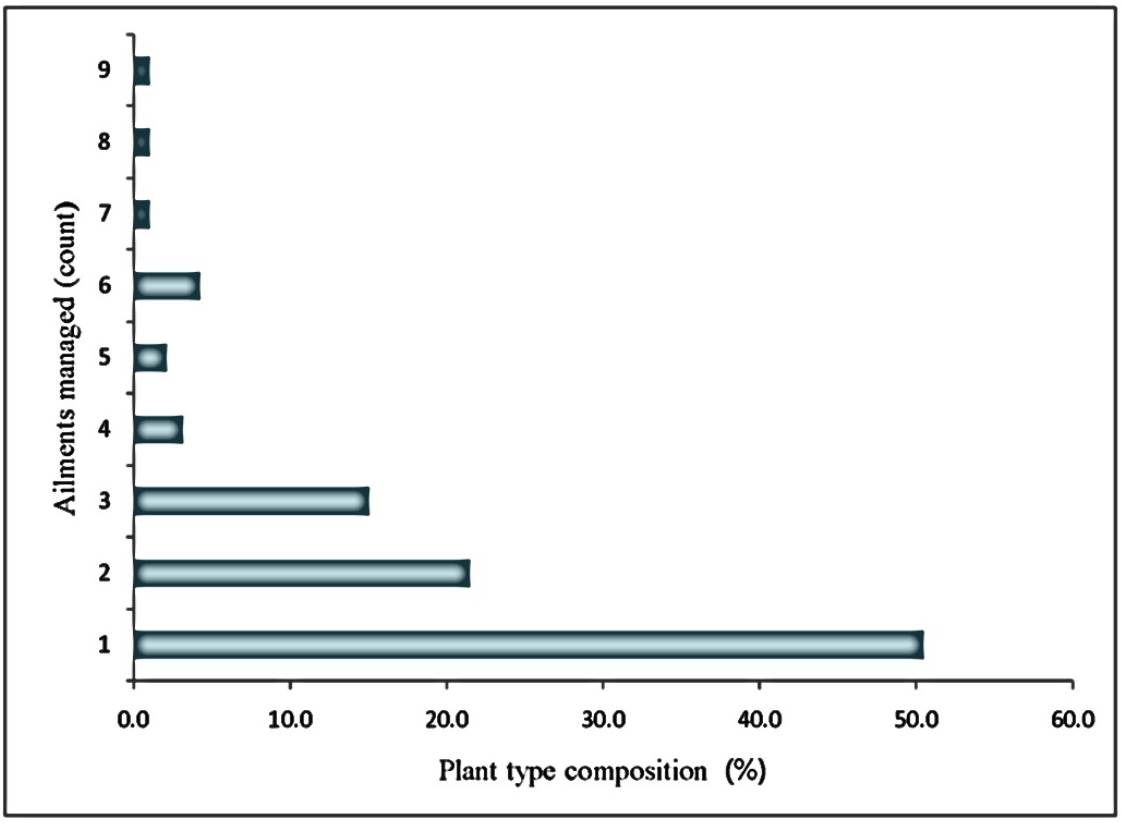


Figure 6-7: Healing plant function by number of ailments

It can be seen from Figure 6-7 above that the majority of plants (51 %) of the 103 plants recorded in Appendix J were monohealing. This means one plant was used in the management of a single ailment. For example, the roots of *muriranyenze (albizia antunesiana)* were prepared into medicine for the treatment of chest pains only. The roots of *murima* (*dalbergia nitidula*) were prepared into medicine that was used to treat wounds only and the leaves and twigs of *rufandichimuka (myrothamnus flabellifolius)* were used as sources of medicine for colds and flu chest related pains. The emerging relationship between the plant type and ailment type treated is one for one. The remaining 49 % of these plants were multihealing. This means the different parts or some parts of the same plant were prepared into medicine that treated more than one ailment. This brings out the plant to ailment relationship of one for two or more ailments. For example, medicine prepared from *mugaranjiva (gymnosporia senegalensis), mupangara (dichrostachys glomerata),* and *mubvamaropa (pterocarpus angolensis)* treated 7, 8 and 9 ailments in that respective order. Multihealing plants are widely reported in literature (Bussmann, & Sharon, 2006; Maroyi, 2011, 2013). This could be attributed to knowledge differences in the plant types used to treat specific ailments across participants. These knowledge differences could be traced to

individual, family and communal levels of knowing.

Figure 6-8 below illustrates the participants' knowledge of treating the same ailment by medicine prepared from different plant species and known to different practitioners. Furthermore, the participants revealed knowledge of different ailments treated by plant medicine prepared from the same plant type as pictured in Figure 6-9 below.

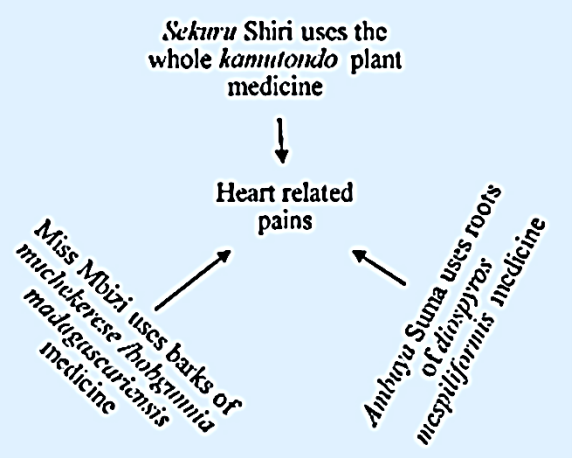


Figure 6-9: Same ailment treating with different plant type medicine

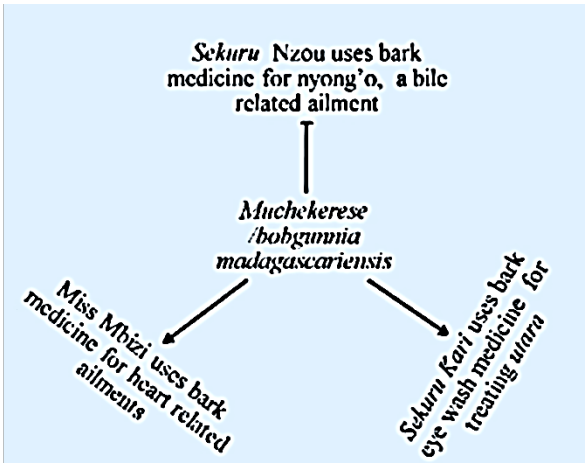


Figure 6-9: Using same plant type for treating different ailments

Concoction medicine was prepared by combining different plant species. Table 6-1 below exemplifies the cancer healing combinations employed by four healers

Table 6-1: Concoction medicine for cancer healing

Healer	**Plant type roots**		
	A	**B**	**C**
Sekuru Nzou	*Zandakubaya gono*	*Zandakubaya gadzi*	-
Ambuya Suma	*Mukundamhuka*	*Zandakubaya*	-
Sekuru Kari	*Dandemutande*	*Muunga*	*Mumbambara*
Sekuru Moyo	*Zandakubaya gono*	*Zandakubaya gadzi*	*Murapazvose*

This use of concoction medicines in treating a single ailment has also been reported in the literature. For example, Zonyane, Van Vuuren & Makunga (2013) conducted an ethnopharmacological study of the Khoi-San traditional medicinal practices of combining plants for ailment treatment in the Western Cape Province. These authors provided a western science explanation of concoction medicine practices. They found out that the combination of *agathosma crenulata*, *dodonaea viscosa* and *Eucalyptus globulus* enhanced the antimicrobial

efficacy. In Peru, Bussmann and Sharon (2006), in their study of traditional medicinal uses of plants, also arrived at a similar conclusion. They discovered that the use of multiple plants to prepare medicine for managing one ailment was a way of synergising the medicinal efficacy of the plants used during the treatment. These explanations concur with my interpretations of *ambuya* Suma's version of "… *ndiko kuti zviite zvakanaka nokuti cancer inonetsa. Muchaona kuti mukuda kushandisa gwenzi rimwe chete hazvifambi*" (Appendix A-01, March 26, 2014). In English, *ambuya* Suma expressed that her combining of the two plant species in treating cancer yielded desirable healing results as compared to the use of a single plant. Here *ambuya* Suma is displaying a dualistic view.

6.2.3.4 Using indomedicine

Table 6-2 below shows many different methods of preparing and administering plant medicine that emerged from data generated with the participants.

Table 6-2: Methods of preparing and administering indomedicine

Method	Description	Variations
Drop	The plant part is crushed or pierced, then soaked in a reasonable quantity of water; or sap is extracted from the tree and dropped into the part	• Water soaked • Sap squeezed • Sap oozed
External	Plant parts are either burnt to charcoal or ashes or pounded and powdered. The powders are placed in incisions with the little finger or mixed with Vaseline/oil then rubbed onto the affected part. Alternatively, sap is rubbed onto the affected part. Plant parts can also be soaked in water and bathed.	• Charcoal *(Matsito)* incision • Powder incision • Body part tying • Powder sprinkling • Ash ointment • *Matsito* ointment • Washing solution • Ball/part rubbing • Sap (squeezed or oozed)
Inhalation	The plant part is dried and burnt. Others are pound and ground into powder.	• Anal smoking • Cigarette smoking • Powder smoking/ snuffing

Insertion	Fresh plant parts are inserted through either the vagina or anus.	• Anal enema • Vaginal insert
Mouthing	Plant parts are crushed, soaked in cold, warm or hot water.	• Hold in mouth (*kufunda*) • Gurgling • Sap apply • Sap smoke
Oral	Plant parts are crushed and or powdered then hot or cold infused. Alternatively the juice is taken through chewing	• Medicated drink • Herbal tea • Water porridge • Juice chew • Powdered porridge/*Maheu* • Powdered honey
Visitation	Visiting the plant for purpose of medication associated with spiritual human powers	• Leaf browsing • Chanting leaves hold • Cattle scratch used tree • Sap picking

The treatment of cataracts (*tsanga*) illustrates these methods of preparing and administering plant medicine variations. For example, a*mbuya* Suma used the *mutsanga* (see footnote 17, p.1 for use and coinage of this npseudonym) sap to remove cataracts through the visitation method. S*ekuru* Nzou soothes the cataract with a *zviyo* (rapoko*)* morsel dipped in the sap of *mubvamaropa* (*pterocarpus angolensis*) tree. Some of these preparations and administration methods were accompanied with rituals, for example chanting, singing and taboos. These variations re-affirm the IKoPH diversities within the Tendera participants.

6.2.3.5 **Plant medicinal efficacy**

The participants of this study held dual meanings of medicinal efficacy: the natural and induced. Natural efficacy related to the bioactive healing effects of plants. In this sense, medicine prepared from plants with natural medicinal efficacy treats physical ailments. Such plants maintain their bioactivity composition irrespective of who uses the plant, the place and time of use. Many ethnomedical, ethnobotanical and pharmacological studies carried out in many countries about indigenous medicinal use of plants focus on western scientifically validated efficacy of such plants as tabulated in Appendix J. In fact, it is widely acknowledged that "at the present moment, phytochemistry and pharmacological [phytochemical] analysis of traditional medicines occupies a key position in medicinal plant

research and indigenous knowledge systems" (Maroyi, 2011, p. 14). This is because plants have been used as raw materials for drug manufacturing in the pharmacological industry. Many of such studies have produced results that confirm the medicinal efficacy of plants recorded in Appendix J. For example, in Kenya *dichrostachys cinerea* (*mupangara)* was phytochemically analysed to provide the western scientific rationale to its indigenous medicinal use (Neondo, Mbithe, Njenga, & Muthuri, 2012). This study "assented to the rational use of this plant in Kenyan medicinal traditions exhibited natural efficacy" (Neondo et al., 2012, p. 036). However, the bioactive validation of the plant's medicinal efficacy offers one dimension of medicinal efficacy.This is the natural efficacy.

Participants also believed in the induced or spiritual medicinal efficacy of plants, which they expressed in many ways. Firstly, healers and Elders accompanied the plant collection, medicine preparation or administration with healing rituals. These rituals which involved religious prayers, such as chanting, singing and sprinkling of snuff onto the ground, were perceived as cultural ways of negotiating with ancestral spirts to induce healing powers into the plant for the desired use (see Frommer, 2003; Mafimisebi & Oguntade, 2010). For example, *ambuya* Suma emphasised that rituals increased "*simba remishonga*" (the strength of the plant medicine). By this, she meant that rituals increased the medicinal efficacy of a plant. The Elders and healers, particularly assisted healers, emphasised and demonstrated strict observation of these rituals and taboos in dealing with ailments that they considered needed such practices.

Taboos (*zviyer*a) and rituals (*muko* or *mhiko*), in healing were known to all the participants. Taboos form a legitimate system of "the inviolable" or "the sacred" in the everyday lives of the Shona people (Pearsall, 1999). All the participants were aware of what Chemhuru and Masaka (2010) observed that taboos have penalties for every violation to punish the offenders. The participants were in consensus that violating taboos had either instant and direct or indirect and prolonged consequences. In addition, these Tendera were in harmony with their place, animals, birds, reptiles and tree-related taboos, for example, "*musatuka, kusvora kana kuridza tsamwa mumasango*" (do not curse the forest) and "*musazunza mazhanje kanakumaturura; nongai epasi*" (do not shake the tree to get sugar plums). In these examples, these participants said that the consequence for a person violating such taboos is immediate in the form of either disappearing or itching vigorously all over the body.

Rituals are a form of taboos connected to healing. For example, *sekuru* Miti said that treating

a woman of infertility inflicted by an evil spirit involved a ritual stage where "she is not allowed to cross any river until the spirit is driven away" (Appendix A-01, March 21, 2014). The instruction of not crossing the river is an example of a ritual taboo that accompanies the plant medicine treatment. Other examples of such taboos held in data included: the browsing of the *munhunguru* (*flacourtia indica*), and *mugaranjiva* (*gymnosporia senegalensis*) leaves in the treatment of diarrhoea; the tying of the waist with a white cloth while drinking *chifumuro* (*kalanchoe lanceolata*) medicine to treat stomach pains, and the debarking of the *mubakatirwa* (*Crossopteryx febrifuga*) tree from the eastern and western sides of the trunk for treating diarrhoea. I later realised that some ritual taboos were metaphoric and with indirect and prolonged consequence. For example the taboo that "*musagara pamhararano; munoita mamota*" (do not sit where the paths cross as you will develop boils) was known to every participant I interacted with. *Sekuru* Miti, an assisted healer, explained to me that, according to their Tendera culture, sitting at a crossroads invites evil spirit related health problems that may happen long after one has forgotten about it. When the offender of such a taboo eventually falls ill, it will be as painful as a boil or carbuncle.

The participants also revealed the consequences of failure to observe appropriate ritual protocols for both the plant's medicinal efficacy and the offenders of the taboos. They emphasised that a focus on the physical plant and its natural efficacy ignored its spiritual aspect and therefore reduced its medicinal efficacy. They also expressed a fear of incurring the wrath of the spirits because of violating the prescribed rituals. For example, *sekuru* Moyo said "… *chipo chokurapa chino nyangariswa kana kurwariswa*" (Appendix A-01, December 19, 2013, CT). This implies that the spirit can withdraw the gift of healing from the violator of the ritual, or cause such a person to be ill. Taboo explanations were not forthcoming like other aspects of IKoPH discussed earlier. However, literature explains that taboos are valid cultural codes of conduct and indigenous epistemological systems (Mawere, & Kadenge, 2010). As such, taboos as cultural symbols of rules and laws whose construction and maintenance are linked to ancestral spirits are meant to inculcate *Unhu* values of respect for all community members. They can be interpreted as also instilling in all community members the responsibility to conserve the natural environment needed for survival. They limit people's destruction of the forests for fear of being punished by spiritual forces.

The participants' beliefs in both natural and induced medicinal efficacy of plants confirm the Tendera people's monist and dualistic realities that are linked to naturalism and spiritualism respectively. The spiritual reality in induced medicinal efficacy brings a mystical complexity

into the healing plant system. The belief in mystery implies prioritising what and the how knowledge of healing with plants, because this practical knowledge serves the survival function of the people. It undermines the importance of the why knowledge because it is explanatory or theoretical knowledge that one can live in the community without knowing. The spiritual efficacy suggests the practical knowledge level of understanding. However, theoretical explanations comparable to western science interpretations could be drawn from some ritual healings. For example, debarking the sides in comparison to ring debarking can be interpreted as tree conservation measures. This is because debarking a side of a tree enables it to regenerate rather than wither away when ring debarked. Figure 5-3 (172) shows signs of recovery or regeneration of the one sided debarked tree. As argued before, such explanations that rest within the dualistic community create a common ground for integrations. Differences broaden the dualistic view to embrace monist perspectives.

The grazing of tree leaves in diarrhoea treatment could also be interpreted as a conservation measure of these tree species. This is because trees, like the *munhunguru*, show multiple healing functions that are important for the survival of a community. As a result, this grazing taboo might be, as much as possible, a way of conserving such trees. It can be argued that grazing of the leaves prevents the people from harvesting the leaves in large quantities as the grazer would only consume a small quantity needed for the treatment. Grazing also keeps the medicinal utilisation of such plants within the local community of Tendera. This argument is controversial, and therefore, prone to a counter argument that grazing deprives these trees of their leaves and the means to produce their own food. It can also be argued that many animals have been feeding from these plant leaves from antiquity, and if the grazing could kill these plants, then the plant species could have been exterminated. All these dualistic arguments rationalise phenomena and typify western scientific ways of thought.

Notably, many of the healing rituals, such as taking medicine whilst tying the waist, walking to the homestead from washing with medicated water without looking back, remain at practical and mystic knowledge level that is not theoretically explicable. This brings out the reality that many aspects of indigenous healing with plants are mystical and therefore complex. The unfortunate part is that such realities have not been documented in detail and were regarded and may still be regarded as primitive aspects of the African healing system. Nevertheless, the reality of the matter is that there are people like the Tendera participants holding these views. This calls for an urgent need to document such knowledge in a way that reflects an African holistic worldview.

6.3 Knowledge gaining

Participants gained the knowledge of healing with plants through community interactions. The day-to-day interaction involved knowledge transfers between members of the community, human and non-human. Michell (2005, p. 40) concurs with this observation and asserts that "non-human elements of an indigenous community exhibit certain powers that can be used for individual, family and community health and survival". The poem *Unoziva* illustrates this principle and explicates the place-based argument that all life experiences in indigenous communities are context specific and are sources of knowledge (Aikenhead & Ogawa, 2007).

Findings showed that a human member of the community of Tendera could learn the knowledge of healing plant use from (1) nature, (2) spirits, (3) other people, and (4) experimentation. These learning modes embody and reflect both on the participants' knowledge development and sharing. Potentially, this informs the appropriate pedagogical approaches, processes and skills that could be integrated into classroom science.

6.3.1 Nature teaches us

In the community of Tendera, some participants revealed that they gained knowledge of plant uses for healing from the behaviour of both plants and animals. This agrees with literature that documents the gaining of knowledge by indigenous people through close observation of nature (see Barnhardt, & Kawagley, 2005; Bastien, 2004; Michell, 2005). Two methods of knowledge development emerged about how some participants acquired knowledge from nature. Some participants were taught about plant healing potential through their behavioural relationships with the ailment that they heal (healing and ailment mimicries). Others were taught by animal uses of these plants (knowledge adapted from animal behaviour) by studying the plants that these animals eat. These findings are discussed in detail below.

6.3.1.1 Learning from mimicries

The following four cases exemplify how these plant-ailment mimicry findings emerged from data. The behavioural relationship between plant and snake venom is the first. *Sekuru* Miti described the *mukwezvanyoka* snake medicine as "*Uturu unorapa uturu … gwenzi rangu iri uturu… saka richirapa nyoka …*", meaning "Poison treats poison … this healing plant is poison … that is why it is able to treat snake bites …" (Appendix A-01, March 21, 2014 CT). On tasting this snake medicine, it caused pricking pains and filled the whole mouth with the

tongue. The explanation given by s*ekuru* Miti suggests that this plant has a natural efficacy. It is quite probable that this *mukwezvanyoka* medicine "contains endothelin receptor antagonist activity against snake venoms' safaratoxins" (Jain, Katewa, Sharma, Galav, & Jain, 2011, p. 266).

Secondly, the mimicry relationship between the worm shelter and *kubuda musana* (haemorrhoids) ailment which was was revealed by *ambuya* Suma is shown in Figure 6-10 below.



a. Worm shelter

b. Haemorrhoid example adapted from http://www.hemorrhoidshemroids.com

Figure 6-10: The shape resemblance of the worm shelter and an external haemorrhoid

She *[Ambuya* Suma] described haemorrhoids as "*tunyama tunenge tumatumbu tudiki tunobuda shure kwatinoita tsvina nako*" (Appendix A-01, January 3, 2014) meaning haemorrhoids are like small intestines protruding through the anus.

The similarity between cancer and the plant used to heal it is the third example of knowledge learnt from plant-ailment mimicries. As shown in Table 6-1 above, *ambuya* Suma used roots of the *mukundamhuka* plant for treating cancer in combination with other plants. This root appears like cancerous lumps, a mimicry relationship that also manifested from the ChiZezuru nomenclature of cancer. The participants referred to cancer as either *mhuka* (animal) or *nhuta* (mole) or *gomarara* (plant parasite). *Mhuka* means an animal and the *nhuta* means a mole animal. The mole burrows into the ground and lives underground. It is not normally seen outside; only its mounds of earth indicate its presence underground. Like the mole, cancer destroys the inside of the body before its effects are noticed. *Ambuya* Suma brought out these similar behaviours of cancer and moles when she said cancer "*inonetsa, inorera … unoyioona nemakumbo ayo*" (Appendix A-01, January 3, 2014). This means that

cancer is a complex ailment that grows inside the human body over a long time. It can be detected by its "legs". By cancer legs, she meant the grey or black patterns on the skin. This is likened to identifying the habitation of the mole by its molehills.

The plant parasite that participants referred to as *gomarara* relates to the parasitic characteristic of cancer. Even some cancer types showed some structural resemblance to that of *gomarrara* as shown in Figure 6-11 below.



a. *Gomarara* sample

b. Cyst (ovarian cancer) sample adapted from http://s1140.photobucket.com/user/nhungoctran/profile/

Figure 6-11: *Gomarara* and cyst resemblance patterns

This naming of some wounds also revealed their nature. For example, the name *rutsva* for scalds reveals the *kutsva* (burning) as cause. *Pfuke pfuke* describes the appearance and disappearance characteristic of wounds connected to cancerous causes. Another wound called *jinda* describes its strong and stubborn persistence as a form of cancer whose name's origin can be traced to the Shona strong warrior, *jinda,* who guards the king.

The fourth and final example of the mimicry relationships is that between the plant and swelling ailments revealed by Ms Zivo about her grandmother, as shown in the ensuing Excerpt 6-7.

Excerpt 6-7: The plant's shrinking behaviour is similar to its swelling reversal effect

> As grandmother was cultivating plants on her small virgin piece of land, she dug up some roots which she threw at the edge of her field. Among the roots was the middle of root that was shaped like a watermelon. She said (grandmother) that she was surprised to see that the 'queer root' was no longer among the others in the following morning as walked and looked over her previous work (*kumema*) ... After work, she dug and took home some other 'queer roots' and put them on her firewood heap. In the morning, she inspected these roots and noticed that they had shrunken. Intrigued by this root behaviour she experimented with the roots as swell medicine. Up to date, almost over 30 years now, grandmother practised swell healing (Appendix A-01, September 26, 2013, CI).

6.3.1.2 Teachings from animals

Some animals offer lessons on knowledge of medicinal plants and ailments they heal through modelling. This means some participants either gained knowledge of plant uses for healing or knew that some people gained this knowledge through the observation of animal behaviour. One of these lessons can be drawn from the baboon story in Excerpt 6-8 below told by *tateguru* Mukono.

Excerpt 6-8: Baboons are teachers

> [W]e are not as wise as baboons. We ate fruits as food and medicine, but we did not eat those which were not eaten by baboons … We befriended baboons, watched them and only ate the fruits they ate … They would get injured and treat the wounds with plant material … and many other diseases. Not all people learnt from baboons, only the wise ones, especially hunters. You cannot question the wisdom of a baboon (Appendix A-01, October 3, 2013, CT).

The above quote underscores the importance of recognising the presence of animals in the community and their value as both sources of knowledge of plant uses for healing and teachers of their knowledge. The baboons, in this case, teach their human counterparts, through modelling their uses of plants, not only as medicine, but also for food for their own survival. This is what Aikenhead & Ogawa (2007, p. 562) imply when they say indigenous people "listen to nature". To this Bastien says, "[a]ll knowledge and wisdom (of indigenous people) comes through the alliances with insects, animals, and plants … animals are a major source of knowledge and their knowledge of the natural world exceeds that of humans" (Bastien, 2004, p. 92). This shows that observation skills can draw lessons from animal

behaviours. However, the statement that "not all people learnt from baboons, only the wise ones, especially hunters" explains that learning from nature was not and is not easy, rather, it is a unique wisdom that is bestowed upon selected protégés by the spirit. This is one angle from which to make sense of Kein's recitation: "Thank you, our ancestors for this wisdom" (Line C13, Excerpt 6-1). Thus to most Tendera participants, observation skills are spiritually gifted.

The snake battles was another example from which some people in the community of Tendera could learn about healing plants from animals that emerged as *tateguru* Dube elaborated as follows:

> **Excerpt 6-9:** Fighting snakes lead to snake medicine
>
> This plant of mine (pointing to it) has been in this locality for centuries. Its use as medicine originated from my early fathers … these animals (referring to snakes) were always there and troubling people, some even to death … our great, great fathers were said to have come across snakes fighting ... snakes are warm hearted to each other unlike us … they do not fight to the point of killing each other. If one is killed during the fight, the killer snake rushes to collect medicine for the dead. Most snakes live within plants which neutralise their venom … they fight for these territories. The killer snake then gives the medicine to the dying one. The dying one wakes up and the fighting continues … He happened to be nearby watching the fight. That is how this *mukwezvanyoka* (holding the plant) came to be the family medicine.… This, of course, does not just happen, *unozviona ndokunge une mashavi ekurapa* [Appendix A-01, March 21, 2014, CT].

The statement in the above excerpt "this, of course, does not just happen, *unozviona ndokunge une mashavi ekurapa*" literally translates to "such incidents can be met by a person with a healing spirit". This again reinforces the idea held by participants that the healing expertise comes from spiritual guidance. In this case, even observation skills are connoted as "spiritual gifts". The excerpt shows that knowledge of snake medicine can be learnt from snake fights. The snakes' behaviour of treating themselves leads to the identification of the plant medicine that human beings adapt for their own uses.

The findings discussed above show how participants can draw knowledge of plant healing from observing plant and animal behaviours. But to observe such behaviours calls for strong

interpretive skills often guided by spirits. Ngara (2007, p. 11) sums it all when she says, "spiritualism is paradigmatic, expressing the notion of exceptionality of ability (or talent) and its biological basis (believed to be given by ancestors)".

6.3.2 Spiritual apprentice

According to the participants, plant healing knowledge could also be obtained through apprenticeship with healing spirits. They identified three categories of healing spirits-ancestors (*midzimu*) or non-relative spirits (*mashavi*) or supernatural/water spirits (*njuzu*)-which concurs with those identified in the literature (e.g. Matsika, 2012). They revealed dreams as central methods through which these healing spirits taught either medium or non-medium practitioners about the knowledge of plant uses for healing. Literature also acknowledges the centrality of dreams which are regarded as ancestral gifts, and are valued for their revelations of indigenous knowledge to the human members of indigenous communities (Aikenhead & Ogawa, 2007; Battiste, 2002; Matsika, 2012).

S*ekuru* Miti's part story on becoming a healer in the following Excerpt 6-10 illustrates one of the spiritual modes of learning about healing with plants.

> **Excerpt 6-10:** Spiritual apprentices
>
> It all started when I was very young. [I saw **images of a very old man in my dreams**. This would happen here and there but not so frequent … I was a strong member of the Apostolic Christian Church. … In my late thirties, I started seeing this **plant in my dreams**] [1]. [With time the old man **told** me where to get the plant from, how to use it and for snake bites] [2] … [one night and others that followed the old man took me up that mountain top. He **showed me the plant and told** again its use and how to recognise it from others similar to it] [3]. He reminded me that he used to visit me when I was very young and told me who he was [*tateguru* Dube]. These dreams for a long time were happening so frequently ... It was awful; I could not even tell anyone for fear of being labelled evil and wizard... my greatest fear was that of being banned from my church … So I kept these dreams to myself … [One day, in a prayer session, **I got into his spiritual trance**. It was my great grandfather, *tateguru* Dube whom I had never seen in real life … This marked **the beginning of my healing practice** with particular speciality in snake bites, with this *mukwezvanyoka* plant] [4]… It can treat and prevent many other ailments … my knowledge is old, from far back *kunyikadzimu* (Appendix A-01, December 3, 2013, CT).

The above excerpt depicts dreams as not only an oral form of knowledge gaining (Aikenhead & Ogawa, 2007), but also appropriate contexts within which such knowledge is transferred. Four main stages involved in healership training were identified from such data. I labelled these stages as imaging, verbalisation, showing, and practising. Figure 6-12 below provides a visual illustration of these phases as interpreted from Excerpt 6-10 above.

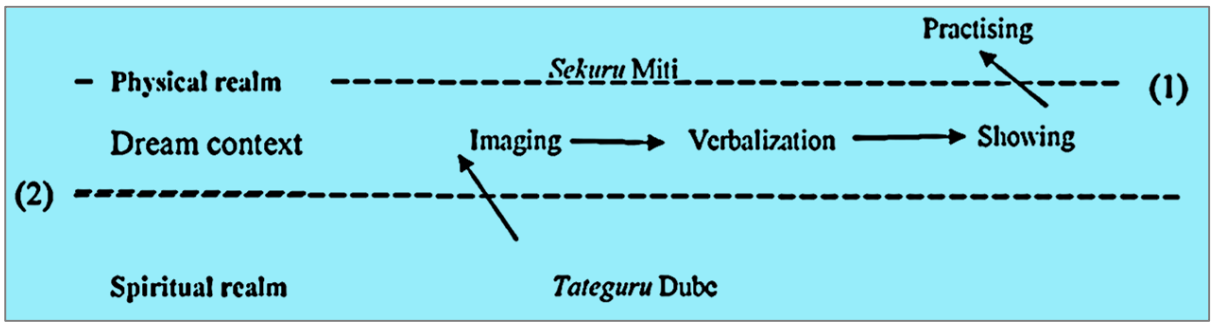


Figure 6-12: Visual presentation of the progression of spiritual apprenticing

Figure 6-12 above depicts the spiritual community. The participants believed in the existence of healing spirits, such as ancestor Dube, to be in this world. Line (2) also separates the spiritual and physical communities. The two spaces above the broken line (2) represent the physical community. The mediums, like *sekuru* Miti, exist and operate in the community of Tendera. The space between the broken lines (1) and (2) represents the dream context. The top line (1) depicts the context of being awake. The lines are broken to depict that knowledge filters from the spiritual to the physical community. The dream context implies the spaces created by natural ways of human living and celestial patterns (e.g. day and night) in the physical community. Dreams are successions of images, ideas, emotions, and sensations that occur usually involuntarily in the mind during certain stages of sleep (American Heritage Dictionary of the English Language, 2011). Dreams can also be described as latent, invisible and highly individualised incidents. This feature makes dreams difficult to prove and, therefore, they are subject to contestation. Nevertheless, their presence is acknowledged in both neuropsychology (Hobson, 2009; Schwartz, Dang-Vu, Ponz, Dulhoux, & Maqeut, 2005) and indigenous literature (Bastien, 2004; Ngara, 2007). Dreaming is a complex experience that is only understood by the person who has undergone it. Dreams also reinforce the mystical and mythical monist worldview that most indigenous people hold. Hobson (2009) contends that the lengths of dreams vary from a few seconds to about 30 minutes. Thus, their informing of indigenous content and pedagogies that could be integrated into classrooms can be justified as relevant to children of the Tendera community.

6.3.3 We learn from each other

The majority of participants said they gained knowledge about healing with plants from their relatives within the social order of their communities. This way of learning took two dialectically related modes of knowing which are: "I was told" or "I heard" (listening), "I saw it happening" (seeing). In Excerpt 6-11 below, *Sekuru* Kari exemplified listening mode.

> **Excerpt 6-11:** There are times when knowers tell it
>
> Our Elders sometimes speak about what they use to treat some ailments. But this depends with relationships and the way they see the person in the community. Sometimes they are forced by the nature of illness to release their knowledge … Like I said before, I was shown the snake medicine by one of my Elders on our way home from a funeral because he knows I help a lot of people and value it (Appendix A-01, December 6, 2013, CT).

The term "sometimes" in the phrase, "Our Elders sometimes speak" in the above Excerpt 6-11 expresses that the knowledge holders now and then disclose their knowledge to other people. This sporadic disclosure of knowledge reveals that, most of the time, the knowledge holders conceal their knowledge and circumstantially disclose this knowledge. *Sekuru* Kari, in the above excerpt, identifies some factors that can lead to the disclosure of knowledge that the knower would otherwise rather keep to him/herself as the knower (holder of knowledge)-knowee (receiver of knowledge) relationship, the status of the knowee in the community from the eyes of the knower, and the nature of illnesses.

Excerpt 6-11 above shows that, not only is IKoPH accessible when favourable conditions prevail, but also reinforces its secretive nature. Emerging is the idea that there are times when IKoPH holders voluntarily or involuntarily reveal their knowledge. This is re-affirmed in the following Excerpt 6-12 in which *sekuru* Nzou said,

> **Excerpt 6-12:** Listening to information directed to others
>
> I just listen carefully to other people being instructed. In serious illness, the knowledgeable people tend to concentrate on alleviating the situation rather than hiding their knowledge … Also, I can directly ask a person whom I know has this knowledge. Sometimes I was given the knowledge and other times not (Appendix A-01, March 23, 2014, CT).

This Excerpt 6-12 illustrates the knower's choices of keeping knowledge to him/herself and disclosing it in a context where illness is threatening human life. In such a case, the knower is

Unhu bound to serve life because as Matsika (2012) puts it, the human being in the African sense is regarded as the most sacred being of all creations who deserves to live healthily. As such, *Unhu* gives high priority to the preservation of human life (Samkange & Samkange, 1980). The knower focuses on alleviating the problem when such situations arise and, in the process, discloses his or her knowledge. *Sekuru* Nzou explains that such situations create opportunities to learn through both seeing and listening.

Drawing from both Excerpt 6-11 and Excerpt 6-12 above, the knowee can only harness this opportunity if he or she is motivated to learn. This makes motivation an integral function of listening and hearing. Such motivation can be linked to the value of knowledge of plant use (see section 6.1.3, p.195). That is, one gets motivated to acquire this body of knowledge because he or she values it for its medicinal effectiveness. In fact, seeing and listening ways of knowing calls for an inquisitive mind that leads the seeker to adopt a "live" personality. Such a personality makes the knowledge seeker attentive and gain knowledge by being present. Direct questioning is an ineffective method of accessing this form of knowledge. This is because engaging in questioning collides with the Zezuru culturally accepted values of respect for secrets or sacredness and to wait patiently to be given this knowledge by Elders. Within day-to-day life in the community of Tendera, listening and hearing emerged as important tenets of indigenous inquiries. Hart (2010) says indigenous inquiries involve deep listening and hearing not only with ears, but also with one's inner feelings. He adds that such thoughtfulness is spiritually and emotionally engaging.

The cases of *sekuru* Nzou and *sekuru* Kari above show that Tendera people interested in gaining more knowledge of healing with plants use a problem-observation-solution frame of inquiry. This is similar to that of western scientific inquiry. However, the difference between the modes of inquiries, Tendera and western scientific, is in contexts and application. In the Tendera context, as shown in these two cases, inquiry takes place within day-to-day life in their land whereas inquiry in western science is largely in a contrived setting of the laboratories. Even if it is community based, such inquiries are pre-planned. Yet, as we have seen above, inquiry just calls for attentiveness within the natural unfolding of events. As argued before, observation and inquiries lies at the intersection of these approaches and provide a common starting point to teach about the difference. This culminates in integration if it is done in the classroom science.

6.3.4 Experimentation

Data also shows instances where some of the participants gained knowledge of plant healing through experimentation as exemplified in Excerpt 6-13 and Excerpt 6-14 below.

> **Excerpt 6-13:** Filling knowledge gaps by experimentation
>
> Sometimes I would get ill and visit a healer … I once told you this story. … This healer gave me the powder medicine to take in water. He did not disclose its identity. When I drank the water medicine I found it tasted like the one I was given by another Elder. My interest in healing plants made me relook at the powder and tasted it. I suspected the plant source of the powder from my long experience of using plants. So I went up that mountain and collected, prepared and tasted. It matched exactly the healer's powder (Appendix A-01, March 23, 2014, CT).

In Excerpt 6-13 above, *sekuru* Nzou shows that the survival need is strong motivation for seeking more knowledge of plant healing than the participants held. It also reveals that learning about knowledge of healing with plants is inherent in processes of knowledge production.

Sekuru Kari's story captured in Excerpt 6-14 below also evidences this experimentation way of learning about plant healing.

> **Excerpt 6-14:** Trial to obtain positive results
>
> I am now mixing this snake medicine with the one I used to treat cancer with ... this is faster. One of my community Elders commented about this climber as we passed through it from a funeral … Snake venom is corrosive like cancer. That is when I decide to try out the mixture … is what I am using now. It's faster [Appendix A-01, December 6, 2014, CT].

This excerpt endorses that the experimentation way of gaining knowledge of plant healing is driven by the desire to solve real life problems. Experimentation is also conducted in modern medicine. As shown in the previous discussion, experimentation becomes a common link to see the difference between the community of Tendera and western medicine approaches. This way of linking similarities to differences creates a space for integrating these knowledge bodies side-by-side at classroom level.

The importance of holistically documenting this knowledge for classroom integration is beyond question. From the discussion above, it can be seen that IKoPH is a complex

knowledge system whose understanding can be achieved through properly accessing it from all its levels, the individual, family and community.

6.4 Healing practitioners[19] and their practices

The people who practice healing with plants at any of the three levels of Tendera are recognised as key indigenous knowledge sources and consultants. It is from such people that indigenous knowledge, such as that of IKoPH can be accessed and learnt in order to appropriately integrate it into classroom science (see Aikenhead, 2002; Barnhardt & Kawagley, 2005). Documenting the knowledge of practitioners, therefore, cannot be avoided because it details human knowledge sources, the depth of the knowledge they hold and its authenticity. Integrating deep and authentic indigenous knowledge of plant healing into westernised classroom science is vital because it emphasises the IKoPH paradigm that gives it its identity. It is argued that valuing this cultural identity in the classrooms is the cornerstone of upholding its status that has been long repressed by colonialism. Data evidences two levels of knowledge for the practitioner and his/her practice. These are the knowledge "for every person" and "for experts" as levels of healing.

6.4.1 Knowledge for every person

At this level, the Tendera healing with plants enterprise emerged as inclusive and accommodative. This conclusion was drawn from the finding that every participant held some substantial knowledge of plant healing. Illustrating how this finding emerged from data are my reflective thoughts in Excerpt 6-15 below.

> **Excerpt 6-15:** Every person uses some plants for healing
>
> Every person seems to have some knowledge of healing with plants in their locality. Of late, even some Tenderans outside my participating groups are volunteering this knowledge. This community has retained most of its natural vegetation. Can this availability be contributing to this all-encompassing knowledge holding status? Does everyone have an equal access to and use of these plants? Yes and No, I am noting differentiated access (Appendix A-01, January 15, 2014, PEI).

The description of knowledge status of Tendera healing enterprise as "all encompassing"

[19] The expression practitioners is here used in a broad sense to mean people who use plants for managing health at any one of the three community levels: individual, family, and community. These practitioners, as human holders of knowledge, together make up the Tendera healing enterprise dimension of the IKoPH.

reveals that this enterprise cuts across age groups. This accounted for the many monohealing plants revealed in section 6.2.3 (p. 205) above. This knowledge for every one is a common level that is linked to the communal ownership of the plants and the need of every person to hold basic knowledge for survival. The participants' perceptions of the plants as belonging to the community, rather than an individual, is drawn from their collective register, such as "our" and "us" in reference to these plants.

6.4.2 Knowledge for experts

Data revealed that at the expert level, the knowledge of the use of plants for healing varies among practitioners (see section 6.2.3 above). This level of expertise accounted for the participants' differentiated access to the plants for healing uses despite their abundance in Tendera. In Excerpt 6-16 below, I reflected on these knowledge variations.

> **Excerpt 6-16**: Knowledge variation in the plant uses for healing
>
> This healing with plants system is also closed. People use different plants to heal same ailments. In some instances they use same plants to heal same illness. More interestingly, they use same plant for different ailments. In addition, places of healing practices with same or different plants vary with the healer and ailments (Appendix A-01, January 15, PEI).

The above excerpt shows that IKoPH emerged as characteristically a closed system at expert level. As discussed in earlier sections, this implies that not everyone has access to every plant for healing uses in the community. The classification and naming of healers varies with nations and authorities (see Dhewa, 2008; Sandra, 2006; Thornton, 2009; Truter, 2007). The sub-category of healers of Table 6-3, p. 230 below shows six types of healers. Participants identified these healers by their sources of knowledge, practice set up (assisted or individual) and the distance from spiritual influence.

In fact, participants revealed that different types of healers existed in the community of Tendera as depicted in Table 6-3 below.

Table 6-3: Healer categories in the community of Tendera

Main category	**Sub-categories**	**Main characteristics**
Healing spirits	Supernatural Human - Ancestral *(midzimu),* - Alien *(mashavi*)	- Exist in the first world - Practice through human beings - Enabled by humans
Assisted healers	Spirit mediums *Homwe or masvikiro*	- Exist in the second world - Functions within mediumistic healing approaches - Alter state of being between ordinary and trance - Function in a group setting
Individual healers	Mediators (*vanyayi*) Orators (*vaomberi*) Prophets (*Varoti)* Herbalists (*nyanga*)	- Exists in the physical world - Functions as an individual - Functions in a single ordinary state - Gains knowledge through various means

It was well known to all the participants that assisted healers alter their state as a living ordinary being into that of mediumistic trance in performing their duties. The participants also pointed out that these healers draw their knowledge for practice from different type of healing spirits. These spirits taught them the knowledge of healing ailments within their fields through both mediumistic trances and intuitions (dreams and visions). This spiritual apprenticeship continues in-service (see section 6.3.2, p. 223). Literature reports that Shona communities, like Tendera, hold assisted healers in high esteem because they view them as those who "follow the traditional customs of accessing, using, sharing, keeping, and valuing traditional medicine knowledge as a symbolic resource with regard to the needs of the surrounding community, or totem group" (Frommer, 2003). This is because their daily operations are inseparable from their interaction with the spirits that trance them.

Participants also identified a spectrum of individual healers who practice in their community of Tendera. They said that the type of healers exceeded by far the number of assisted healers in Tendera. These fell into four different groups in accordance with their functions. These are mediums (*vanyai*), orators (*vaomberi*), prophets (*vafemberi*) and herbalists (*makwenza*). The mediums and orators have knowledge of plant healing through close interactions with

assisted healers and their healing spirits (Frommer, 2003). The prophets acquire knowledge for healing through dreams and visions whilst the herbalists largely gain their knowledge from other people, common or expert practitioners.

However, evidence suggests that some of these healers may be bogus. Chief Tendera expressed this point in Excerpt 6-17 below.

> **Excerpt 6-17:** Bogus perceptions of n'anga
>
> I do not like n'angas. They are pretenders interested in money … In our culture of long ago designated spirit mediums looked after us … these people have infiltrated my land. They should leave my land … they buy and sell our traditional customs and values. This is not my land, it belongs to our ancestors. They do not like their knowledge to be sold and bought [Appendix A-01, February 28, 2014, CT).

Reference to n'angas as "pretenders", as "interested in money" and as "infiltrating the community of Tendera suggests that these healers do not conform to the people of Tendera cultural frameworks of healing. The practices are driven by individual economic needs that are against the collective principle of the *Ukuma* and *Unhu*. As Chief Tendera laments, this group of healers' interests mainly lie in the physical plants and their medicinal properties. Some of them, called vendors, "harvest and sell medicinal plants, either raw or partially processed" (Dhewa, 2008, p. 6). This does not conform to the holistic beliefs and practices of the Tendera community's IKoPH.

These findings showed that, like other dimensions of IKoPH, the practitioner enterprise is diverse and complex. Access to authentic knowledge is the greatest threat this enterprise diversity presents to the integration of IKoPH into classroom science. So, in integrating indigenous knowledge of plant healing into the classroom, care must be taken to distinguish the genuine from the fake.

6.5 Knowledge of healing places

To the participants, their community of Tendera is a place of multiple functions. It is a home to them; it provides them with plants for their health needs and offers different spaces for healing. Data showed several places for healing in the community of Tendera. Examples of some healing places are shown in Figure 6-13 on the next page 232. The participants' identified some of these places as sacred and others as ordinary. It is important for researchers and teachers to be knowledgeable about these places of healing because they have

a bearing on, not only where integration of the two knowledge systems should take place, but also what to teach and how to teach it. Inappropriate context for integration might result in undesirable outcomes.



Figure 6-13: Examples of places for healing with plants

6.5.1 Sacred places

Data showed that the healing of spiritual ailments is conducted in sacred places, particularly by assisted healers. *Ambuya* Soko showed these links in Excerpt 6-18 below.

> **Excerpt 6-18**: Sacred places are appropriate for healing spirit related ailments
>
> The family waits at that place outside this *nhumba* (hut) … I present their problem and how I will handle it as given in dreams…. If agreeable, we move to *madziva* (natural water pools). If not, I then call upon *muchembere* (the female spirit) for further clarification … we then move to the waters, ... pressurise the evil spirit on the person to talk … then drive it away. Treatment of the head and body continues in this hut… the patient finishes the course at his or her home [Appendix A-01, November 25, 2014, CT).

The participants described the "*banya*" or "*nhumba*" as a hut used for healing by assisted healers. These huts are "constructed from poles of different trees in the community of Tendera," (Appendix A-01, October 31, 2014, CT) explained village head Gomo. Thus, healing spirits that drive the operations of their mediums require special spaces for them to provide healing services. The spirits use the huts build from trees to provide the people with healing services to reinforce the holistic community principle of interdependence and interconnectedness. Excerpt 6-18 above shows that healing spiritual ailments involved one or two sacred place phases. Examples of the sacred places shown in Figure 6-14 above are: (a) banya or nhumba; (b) caves; (c) on top or bases of mountains; (d) natural pools; and (e) places under certain trees. Taboos attached to these places were common knowledge to all the participants. These participants were also conscious of the individual and communal consequences of violating such taboos.

Both the *banya* and associated taboos have equivalents in the western medicine. *Banya*, as a special place for indigenous medicine consultations and treatment, is equivalent to the surgery within the terminology and practices of western medicine. The medical uses of each place conform to the medical systems from which their uses and meanings are rooted. The *banya* symbolises spiritualism whilst the surgery signals western trained medical doctors whose knowledge and operations do not include spiritual aspects. Viewing taboos are codes of conduct that correspond with instructions within theatres and surgeries, such as "staff only" and others. In both cases, no explanations are given behind the codes of conducts. This comparison, as argued before, provides the necessary differences and similarities needed to strategise the integration of indigenous knowledge and western science at classroom level. It

is helpful to distinguish these two places by qualifying the type of surgery as indigenous surgery and western surgery. In this terminology, the term surgery provides the common ground from which to integrate similarities and differences of these two medical systems.

6.5.2 Common places

All the participants were quite aware of the initiation of healing practices in common (public or ordinary) places. Excerpt 6-19 below is a conversation I had with one of the community Elders given here as an illustration of some of the common places used for healing.

Excerpt 6-19: A bus stop used as a place for healing

Elder:	Are you hypertensive?
Vakutsigira:	Yes, why?
Elder:	Your feet are swollen.
Vakutsigira:	U-um… but I am taking tablets.
Elder:	Since when?
Vakutsigira:	They started swelling since 2007 … I have been taking tablets from 2004.
Elder:	[To Mr Chima] come and collect some powder for her which has worked for many people I have given … It might help you also (referring to me) (Appendix A-01, February 8, 2013, PEI).

As the above Excerpt 6-19 demonstrates, the bus stop was transformed into an indigenous surgery where consultation was done and prescription given orally. This shows that every place in the community of Tendera can be transformed into a place for healing. Such commonplace healing practices were closely linked to the lifesaving value of *Unhu*. A comparable approach appears also in western culture where a professional doctor offers a pro-bono service to clients. More often than not however, western culture dictates that the patient visits the doctor's workplace. This comparison, as I have argued before in the previous sections, provides us with free medical services as a common ground aspect from which we can teach about the differences between the *Unhu* and pro-bono driven services. Thus showing that integration of the two knowledge bodies within the classroom science space is possible.

The foregoing discussion shows that the many places for healing in the community of

Tendera, like all the other aspects of IKoPH discussed above, take place on two levels, the common and sacred. The sacred places symbolise the spiritual community whilst that of common symbolise the physical community. The use of each place for healing depends on a number of interrelated factors, the type of healer, ailment, perceived causes, type of medication and patient. However, the use of sacred places for healing was more assisted healer oriented. The common places were those used by both assisted and individual healers. All these culminate into a complex knowledge system.

6.6 The Tsime concept of the community of Tendera

This chapter has shown that Tendera community is rich, not only in plants, but also in people knowledgeable about healing uses of these plants. This community, therefore, can be described as a reservoir (*Tsime*) of IKoPH. *Tsime* is a metaphor expressing this reservoir sense in the language of the Tendera participants. *Tsime* is a source of water, therefore, a source of life. Like a *Tsime*, the community of Tendera is a source of indigenous knowledge of plant healing, therefore a source of life. Figure 6-14 below models the Tsime of IKoPH perspective of the community of Tendera.

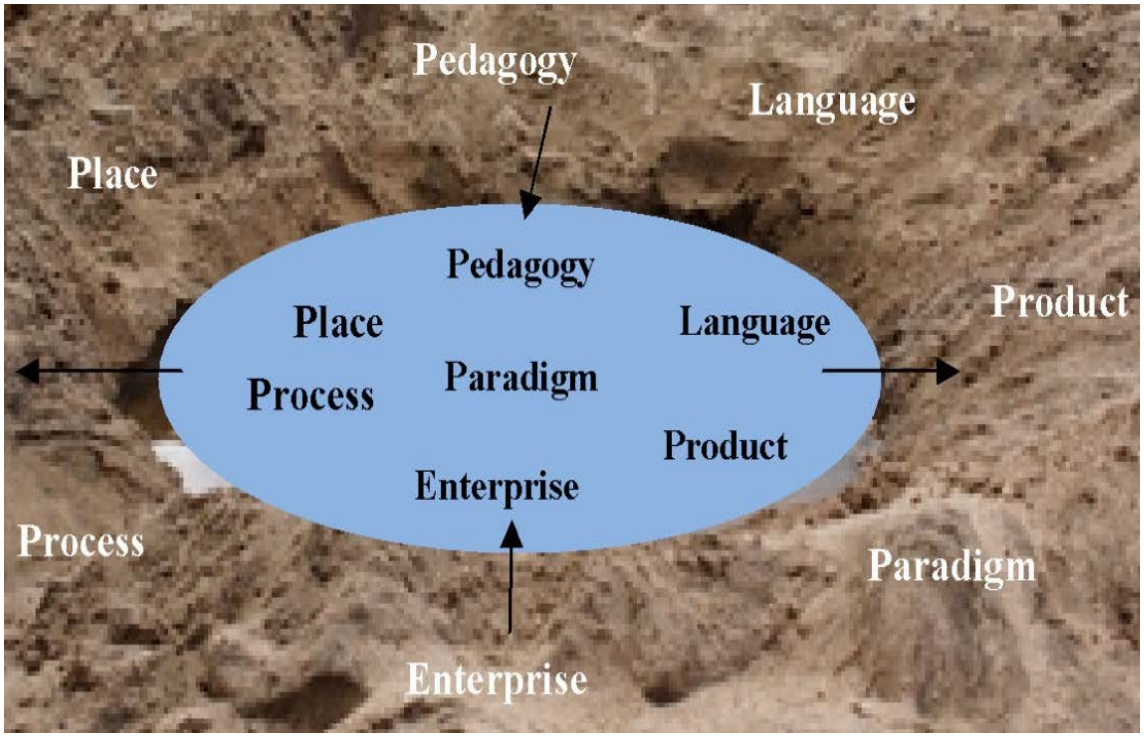


Figure 6-14: Tsime model of IKoPH

The water (blue area) and earth area (brown area) of this model represent the two main levels in which indigenous knowledge of plant healing exists, the spiritual and physical. The spirits

are invisible and their depth of IKoPH is unknown like the depth of the water in the *Tsime*. The underground existence of water is evidenced by its surface. Likewise, various symbolic activities, such as assisted healership, rituals and sacred places, among others, manifest the existence of spirits. The depth of the waters can only be imagined to infinity to metaphor that indigenous knowledge of plant healing is deep and its depth is left to imagination. The vast land area shows the breadth of this knowledge system. The dependence of human beings on the spiritual community for plant healing knowledge is depicted by outward arrows. The inward arrows, from the physical to the spiritual community, show the act of negotiating and requesting for wisdom and guidance in managing health using plants. These arrows together depict a reciprocal relationship existing between the spirits and the human beings. From now, I describe indigenous knowledge of plant healing existing in the community of Tendera as "Tsime" knowledge for the purposes of context specificity. This Tsime knowledge provides insights into rural communities' rich sources of IKoPH.

The Tsime knowledge is at the disposal of every Tendera person. Each Tendera participant can access the plants in the Tsime known to him or her for medicinal uses. Their collective medicinal uses of plants define their human life span. The context from which this concept of life span emerged, I call the "Tendera wheel of life" (Figure 6-15). This life span concept is embodied in data such as "Life saviours our plants are, from creation to death" said Kien (Line D14-18, Excerpt 6-1) and "Healing plants are important for our overall wellbeing, throughout our lives" said s*ekuru* Miti (Appendix A-01 March 21, 2014, CT).

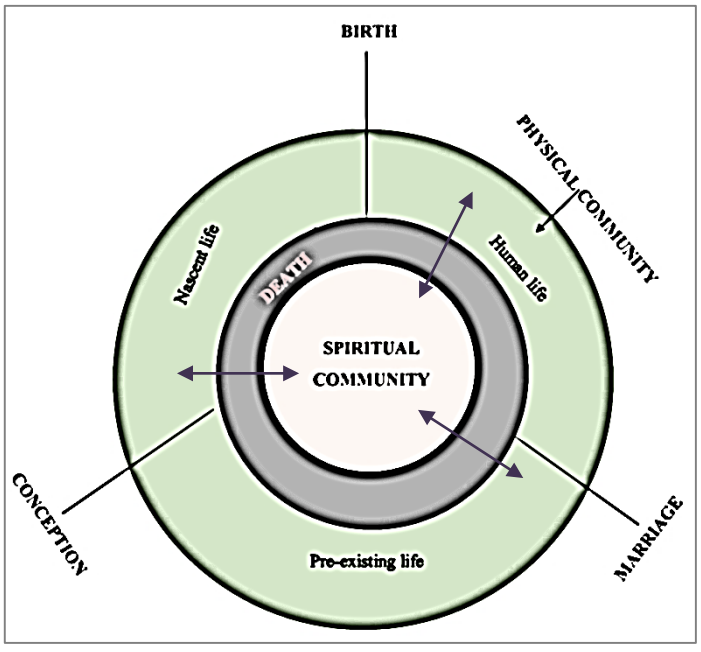


Figure 6-15: Tendera wheel of life

As shown in Figure 6-15, the wheel of life connects human and spiritual communities as shown by the reversible arrows. Tendera participants' dependence on the spiritual community for their health needs is illustrated by the arrows from the spiritual to the physical community. The reverse arrows show that at each life, death (represented by the purple space) facilitates the exit of a person from the physical community into the spiritual community (Matsika, 2012). The participants' revealed that the people of Tendera perform rituals in which plants are used as rites of passage to the spiritual community. They believed that failure to perform such rituals results in the spirit wandering about in the physical community in an evil or destructive manner. Such spirits then cause illness in the community. The participants held the belief that some people die with others being conceived, born and growing up in their community in their wheel of life. This wheel of life is marked by four major occurrences in the community of Tendera. These are conception, birth, marriage, and death. To the participants, failure to manage illness leads to premature death. To prevent this, the Tendera participants use plants across the wheel of life. This is embraced in Elder Mapiri's emphasis of "*kutsengerwa, kugezwa, nokupfungaidzirwa makwenzi sechiraramo chokukura kwemunhu*" (Appendix A-01, March 30, 2014, CT). *Kutsengerwa makwenzi* expresses the oral administrating of indomedicine to heal the physical ailments. *Kugezwa nemakwenzi* relates to the practices of washing the body with plant medicated water in the belief that it chases away evil spirits or prevents them from attacking a person. *Kupfungaidzirwa makwenzi* means a practice of putting medicine in a powder or dry form in hot coals and covering the person with cloth to inhale it. All these healing ways are practiced in efforts to prevent or treat ailments at any one of these stages in the physical community. The expression *sechiraramo chokukura kwemunhu* means "during growth and upbringing of a person in the community of Tendera".

There are many complex forms of Tsime knowledge, and a careful selection of what to include in the integration with school science is necessary. This is easier when the knowledge is documented than in its oral form. The Tsime knowledge can be written in a way that resembles as much as possible its oral existence within its cultural milieu (holistic documentation). As this chapter is showing, holistic documentation is imperative and recommended because it retains the Tsime knowledge and cultural identity. In addition, it details connections between the different hepta dimensions of Tsime knowledge that not only provides possible aspects for classroom science, but also teaches integrators about these elements. For example, different knowledge aspects for the classroom can be drawn from the

holistic concept of the Tendera community (section 6-1) as shown in Table 6-4 below.

Table 6-4: Examples of Tsime aspects for possible inclusion into classroom science

Classroom aspect	**Tsime knowledge aspect for possible inclusion into classroom science**
Purpose	Knowledge for survival that is in the classroom context learners should be taught health management with their local plant content in a way that gives them wisdom to overcome health problems they experience in the community.
Enterprise	Classroom as: • A community of practice • part of a larger community • Dependence on each other value based interactions • Knowledge holders
Language	ChiZezuru as: • language of content • language for communication • Symbolism - Behaviours - verbal - Artefacts
Content	Holistic concept of the community • Structure of the community • Individual, family and community • Spiritual and physical community • Land and vegetation • Community resources • membership notion • Conservation • Relatedness: interdependence and interconnectedness • Plants • Medicinal functions • Sources of knowledge for medicinal use • Medicinal efficacy • Spiritual custodianship • Animals • Ailments
Pedagogy	• Working together • Listening, watching and dialoguing • Songs, poems • indigenous games
Place	Natural settings in the community

Some of the aspects of Tsime knowledge suggested for classroom practices in Table 6-4 above are too broad, for example, plant medicinal functions. To unpack such broad topics

into sub topics and concepts, one has to examine other themes of Tsime knowledge recorded in other sections. In this example, the medicinal functions of plant sub topics and concepts can be drawn from section 6.2.3 above. Some of these topics and concepts drawn from this section include the locations of medicinal plants, the most useful parts, and the methods for preparing and administering indomedicine.

Pedagogically, such topics can be taught from working together. Several stories recorded in different sections of this chapter can be used to teach this health topic. For example, Clara's wound treatment story reported in the previous section 6.2.2 happened in real life and insights us into the community's suffering from the consequences of many health problems. So, using such stories in classrooms aligns with the principle of community-based pedagogy. This opens up avenues to the use of a multitude of teaching methods, such as problem solving, collaboration, group work, among others that enhances the cultural relevance of westernised classroom science to the indigenous learners. But without this holistic documentation of Tsime knowledge, such connections could easily be missed. Moreover, some knowledge aspects could easily be taken for granted and continue to be left out of classroom science. In fact, knowledge taken for granted is a level of complexity that calls for research to make sense of and document it.

6.7 In conclusion

This chapter has shown that hepta aspect of Tsime knowledge are complex sub-knowledge systems that together interrelate into a broad and deep multidimensional and complex plant healing knowledge system that requires proper research. The importance of documenting this body of knowledge, not only as means to understand it, but also as a resource building process for classroom practice should never be underestimated. Failure to do this might result in an incomprehensible knowledge form that will be difficult to use for inclusion into westernised classroom science. Classroom science should then be integrated with Tsime knowledge explored in this chapter. According to Lawton (1975), it is from such complex bodies of cultural knowledge that a balanced school curriculum can be moulded. In this case, it is the Junior Certificate science curriculum currently on offer in Zimbabwe. The next Chapter Seven explores what possible opportunities there are for such integration.

7 CHAPTER SEVEN: POSSIBLE PLACES IN THE CURRICULUM FOR INTEGRATING TSIME KNOWLEDGE

> The state must take measures to preserve, promote, indigenous knowledge systems, inherited resource, including knowledge of medicinal plants and other properties of animal and plant life possessed by local communities and people (Constitution of Zimbabwe, 2013).

7.0 Introduction

In light of the above quotation, education can be regarded as an important vehicle to promote and conserve cultural resources, such as indigenous knowledge. But a question this evokes is: Where in the Zimbabwe Junior Certificate (ZJC) science curriculum could some aspects of Tsime knowledge recorded in Chapter Six be fitted? The answering of this integrative sub-question is significant because it is the prerequisite for the teaching of Tsime knowledge in science classrooms. The integration aspect is addressed in this chapter by identifying integrative opportunities in the ZJC science curriculum for placing some Tsime aspects. The chapter starts by discussing the concept of integrative opportunities as identified in this study. This is followed by the presentation of findings around the six themes that emerged in the analysis of data.

7.1 Integrative opportunities

The analysis of the curriculum documents and the Tsime knowledge revealed opportunities for integrating the Tsime knowledge into the ZJC science syllabus. It was informed by the enterprise, content, language, purpose, pedagogy and place (ECL3P) or holistic classroom science framework (see section 5.7.1.2, p.184). For the purpose of this study, a curriculum place is learning area described in terms of a unit topic and allied concepts or purposes of learning, learning environment, language of instruction and pedagogical approaches. As an example, the “Unit A: Learning to be a scientist” in the ZJC science syllabus is a place in the curriculum from which integrative opportunities could be identified. Such unit topics break into sub-topics and concepts that provide further places for integrating Tsime knowledge.

An opportunity for integration arose by comparing each ECL3P aspect of classroom science in the curriculum documents with the equivalent of the Tsime knowledge documented in Chapter Six. These integrative opportunities were arrived at through a three-stage analysis. Firstly, curriculum statements were identified for each classroom. For example, the goals,

aims and objective statements of the syllabus were identified as reflecting the purpose of teaching and learning science at ZJC level. Secondly, each statement was then examined to establish its nature. Thirdly, the classroom aspects were compared to the Tsime knowledge equivalent to establish their differences and similarities. A similarity implied a common aspect to Tsime acknowledge and classroom science that lies where these two knowledge systems intersect. Many scholars in integrative classroom science call the intersection the "third space" that allows the teaching of a phenomenon from both indigenous and western science perspectives (Figure 2-3, p. 57). Similarities between classroom science and Tsime knowledge, therefore, provide integrative opportunities. Differences between these two systems of knowledge also provide integrative opportunities in that classroom science needs to accommodate different ways of understanding the world. However, differences between classroom science and Tsime knowledge aspects were only realised as integrative opportunities in as far as their alternative conception in the curriculum and in Chapter Six could be established. This identification of integrative opportunities is illustrated using the syllabus Unit A topic "Learning to be a scientist" as follows:

As discussed above, this topic is a curriculum place. It defines the learning content about what scientists do and what the process of generating scientific knowledge is. Before integration, the term scientist in westernised classroom science, connoted a western scientist (see footnote 1, p. 1). This is because the syllabus was modelled on western science principles and, therefore, the syllabus oriented the teaching of this topic from a western scientific perspective, which is the nature of scientific inquiry. Thus, the search for integrative opportunities in this topic starts from embracing a multicultural perspective of the term "scientist". As discussed in the literature review (section 2.3.2, p. 31), this multicultural perspective argues that there are many sciences grounded in different cultures in the world and, therefore, western science is only one of these sciences (see Aikenhead, 1996; Ogawa, 1995; Snively & Corsiglia, 2001). This multicultural perspective of science broadens the term scientist to imply either a western scientist or an indigenous scientist. The western science ways of knowing are different from those of indigenous knowledge, specifically those of the Tsime knowledge. For example, whilst western medical knowledge is western scientific experimentation (inquiry) developed, that of Tsime knowledge is developed through various forms of indigenous inquiries as part of lived experiences (see section 6.3, p. 218). This difference presents an integrative opportunity because the alternate concept of science and indigenous inquiry has been omitted from the ZJC syllabus. Making the Tsime inquiry

approach and interpretation of science as Tsime knowledge and the scientist as indigenous knowledge developer promotes the sharing of this curriculum place with that of western conceptions already in the syllabus. This is side-by-side coexistence of the Tsime knowledge and western science in the curriculum. It is defined by the quadruple (E3P) model as parallel integration (section 2.2.1, p. 29). Logically, integration within the topic "learning to be a scientist" means teaching it from two perspectives that makes each retain its cultural identity, that is, "learning to be a western scientist" and "learning to be an indigenous scientist". However, the learners, being indigenous themselves, cannot learn to be indigenous scientists but, instead, can further develop their indigenous knowledge, such as Tsime knowledge, through participation in classroom science. This reasoning supports the rephrasing of this topic to "understanding our indigenous ways of knowing". But for European children with a non-indigenous cultural background, the topic "learning to be an indigenous scientist" can still be appropriate.

A similarity between a western science view of phenomena in the syllabus and that of the Tsime knowledge implies a common ground. This common ground has been defined by the integration model (see Figure 2-3, p.57). Similarities were identified from syllabus statements presumed to be taught from a western science perspective that would intersect with those of Tsime knowledge. For example, the content statement "Behavior of animals" (ZJC Science syllabus, 1993, p. 6). The reasoning here is that observing the behaviour of animals is common to Tsime knowledge and western science ways of knowing. But how and where these animals are observed may be different within these two knowledge systems. For example, within western science education, the ZJC science syllabus directs that learners be taught to observe the behaviour of animals in the laboratory (ZJC Science syllabus, 1993, p. 6). In contrast, the animals are observed in the community of Tendera with the unfolding of life events. The syllabus content statements, such as behaviour of animals, were identified as neutral and therefore, considered as a common ground from which this phenomenon could be taught from these alternative ways of knowing western science and Tsime knowledge. The identity of phenomena within the intersection of western science and Tsime knowledge perspectives, therefore is an integrative opportunity. Neutral curriculum statements, therefore, create opportunities for the teaching of such concepts in the indigenous way as well. This integration opportunity is also parallel in nature as it allows side-by-side teaching when the alternative Tsime knowledge conception is incorporated into the western curriculum.

Table 7-1 below summarises the findings that emerged from this comparative analysis between the Tsime knowledge and classroom science as defined in the curriculum.

Table 7-1: Comparison of Tsime knowledge and classroom science

Theme	**Tsime Knowledge**	**Classroom science**
Nature of enterprise	All human community members	Teachers and learners
Learning environments	Natural setting	Controlled settings
Purpose of learning	Current survival	Preparation for world of work
Source of Content	Human and nature	Written documents
Language of knowledge	High ChiZezuru	Scientific English communicated
Knowledge transfer	Life centred	Learner centred

A comparison of the two knowledge systems in Table 7-1 above points out differences and similarities between aspects identified in the theme column. In the table, one can see that in the Tsime knowledge teachings, the learning of knowledge and skills is provided for the community of Tendera for the survival of the child, whereas in classroom science, teaching and learning are interactive activities between teachers and learners within a controlled setting and guided by written documents. The teachers and learners communicate in English that is alien to indigenous ChiZezuru speakers of Tendera. These findings are discussed in detail under each of the six themes listed in Table 7-1 above. For each theme, I take an aspect from the western oriented classroom science, as depicted in curriculum on documents. The science curriculum framework in relation Junior Certificate level is shown in Figure 3-4 (p. 105). I analyse the curriculum aspect to see if there is an opportunity to fit an equivalent aspect of indigenous knowledge into the syllabus. I draw from the aspects of Tsime knowledge documented in Chapter Six. If there is an opportunity for integration, I explain how it could be done. If not, I point out the shortfall in the syllabus.

7.2 Nature of the enterprise

The hepta knowledge model (see section 5.7.1.3, p.184) describes an enterprise as a group of people constructing knowledge through a process premised on a shared paradigm (see section 2.2.1, p.26). This enterprise description extends to classroom science enterprise that is simply

referred to as “the classroom enterprise”. This is a dimension of the holistic classroom science model which focuses on the teaching and learning of science as described in Excerpt 7-1 below.

> **Excerpt 7-1:** Teachers help learners to learn western science
>
> This syllabus is designed to cover the first two years of secondary science … The syllabus **aims to equip pupils** … The aims of the syllabus are to **enable pupils to** … Pupils will be able … Emphasis should be placed on **providing pupils** … The suggested activities and examples are in no way exhaustive and **teachers** are encouraged to use their own examples (ZJC Science syllabus, 1993, p. 2).

Excerpt 7-1 above makes it apparent that classroom science is a domain of teachers and learners. The phrases in bold, such as, “aims to equip pupils”, and “teachers are encouraged to use their”, provide two main characteristics of the classroom enterprise. Firstly, in western science education, teachers and pupils (learners) make up the classroom enterprise. In Tendera, children (learners or pupils), Elders, teachers and healers are all healing practitioners, therefore, constitute the Tsime enterprise (section 6.4.1, p. 228). This analysis clearly shows that healers and Elders are excluded from the current classroom enterprise. This observation characterises the classroom enterprise as exclusive and restrictive. On the contrary, the Tsime enterprise’s incorporation of everyone means that it is inclusive and accommodative. This difference brings out an enterprise opportunity for integration, which can be exploited by extending classroom activities beyond teachers and learners to include community members, the healers and Elders.

Secondly, this excerpt from the syllabus illustrates that the emphasis is on the separate role of teachers and learners within their classroom enterprise. That is, teaching for teachers and learning for learners. The teaching role of the teacher is reinforced in the methodology statement that “the syllabus provides a fairly logical order, which the teacher or school may modify as they see fit” (ZJC Science syllabus, 1993, p. 4). This methodology statement further confirms the syllabus’ guidance of classroom practices. In western education, the assumption behind this learner-learning role and teacher-teaching role is that teachers are more knowledgeable than learners. This is because teachers have undergone training oriented in western education systems that the children have not. This western-grounded system of education was colonially introduced into Zimbabwe (Matsika, 2012). In the Tendera community, knowledge exchanges take place among community members within a web of

relationships (see section 6.1.2, p. 194 in conjunction with section 6.3, p. 218). The situatedness of the Tsime knowledge across the Tendera wheel of life (Figure 6-15, p.236) implies that teaching is not the monopoly of western science educated personnel, but rather a responsibility of every community member. Unlike in the classroom enterprise where learning is for children, in Tendera, it extends to every community member who may be deficient in a particular knowledge aspect of healing. The transferors (knower or teacher) and recipients (knowee or learner) of this Tsime knowledge have no fixed roles, but rather have alternate responsibilities. The teacher and learner at any given time depend on who is more and less knowledgeable about a healing phenomenon in question. This responsibility difference between the members of the classroom science and Tsime enterprise, therefore, lies between the fixed and flexible roles. These differences in responsibility, therefore, provide opportunities for the reversal of roles between teachers and learners in the classroom. This shows that, in the western paradigm, the teacher is the authority of science content and methodology, and can therefore provide meaningful learning experiences. In Tsime knowledge, the knowledge holders are not the teachers only, even the learners may have more authority than the teachers, and therefore the teacher has to adopt two seemingly contradictory roles, that of knowledge holder, and that of knowledge facilitator. As a facilitator, the teachers acknowledge their limited understanding of Tsime knowledge and recognise learners as their potential teachers. In addition, there is also a need to document this knowledge from Elders and healers who are more knowledgeable about Tsime knowledge.

Research conducted elsewhere has registered successes in integrating indigenous knowledge into or with classroom science through the teacher collaboration with indigenous knowledge experts, such as Elders and healers. Examples of such projects include the *Rekindling Traditions in northern Saskatchewan of Canada* (Aikenhead, 2002); *Indigenous elementary students' science instruction in Taiwan* (Lee, Yen, & Aikenhead, 2012); and the *Alaska Rural Systemic Initiative* (Barnhardt & Kawagley, 2005). Essential to these integrative classroom science collaborative projects is a noticeable shift from the traditional teacher and learner in classroom science participation to the incorporation of experts (Elders and healers) in a community. As reported in these studies, such extensions of the inclusion of community people have proved to be appropriate and inevitable approaches for overcoming many teacher-related challenges to integration. These, as discussed in Chapter Two, section 2.5.6 (p. 75), include understanding of indigenous knowledge and how to teach it.

7.3 Learning environment

In the language of western science, an environment in which science is learnt or developed is called a laboratory. A school laboratory is a physical infrastructure where teaching and learning of science takes place. The curriculum guides on the teaching and learning of science in the laboratory environment. In a few instances, the curriculum calls for the teaching and learning of science in a natural environment. The following Excerpt 7-2 below illustrates these two learning environments for science, the laboratory and natural settings.

> **Excerpt 7-2**: Laboratory and natural learning of science spaces
>
> Physical phenomena to be observed include change of state, simple experiments … and electrostatic experiments … observing the behaviour of a selected animal both in the laboratory and in its natural environment (ZJC Science syllabus, 1993, p. 5).

The examples of simple experiments given in Excerpt 7-2 above are all to be conducted in the laboratories. Alternatively, these experiments are conducted in ordinary classroom environments where the laboratory structure is not available, like in Deve and Gomo Secondary Schools. To further this laboratory based science teaching and learning, there are nearly completed laboratory buildings in these schools in fulfilment of the Science., Technology and Innovation policy (2012) as emphasised in Excerpt 7-3 below.

> **Excerpt 7-3:** Emphasis on laboratory space based science learning
>
> Science subjects must be taught in a manner that allows each pupil to undertake direct practical experimentation regularly ... Functional science laboratories must be in place and be maintained in all schools (Science, Technology and Innovation, 2012, pp. 5–6).

Excerpt 7-3 above illustrates that indoor science activities dominate the westernised ZJC science curriculum. Though the curriculum stresses the teaching of science in the laboratory (indoor teaching), there are few instances where the syllabus directs teachers to consider the natural environment for teaching science. For example, in the activity statement that "observing the behaviour of a selected animal both in the laboratory and in its natural environment" in Excerpt 7-3 above, the curriculum opens up beyond the laboratory to the natural environment. However, my analysis revealed greater emphasis on laboratory experiments, and therefore that is the environment for science across the ZJC syllabus and other curriculum documents.

Teaching in the indigenous context is different from the above scenario. Brayboy and

Castagno (2008, p. 732) point out that

> indigenous peoples would argue that their laboratory is the world and that their survival rested on puzzling over observations and phenomena and coming to make sense of them in ways that allowed them to survive.

These authors' use of the term "world" represents an alternative environment for learning indigenous knowledge to that of the school laboratory for learning western science. In Tendera, findings show that the participants, including children, acquire the Tsime knowledge they hold in their home world of birth and upbringing. This implies a natural setting as opposed to the contrived environment of the laboratory or classroom. The Tendera children accumulated this Tsime knowledge during their normal upbringing and real-life setting (see section 6.3, p. 218 as read with section 6.6, and p. 235). The Tendera children learnt about healing in their local community and in natural places of learning provided by their local environment that includes forests, mountains, rivers, homes, and fields. The natural environment and healing activities taking place allow the Tendera children to gain Tsime knowledge through a variety of ways. Observation includes the use of one or more senses within a natural setting to make sense of or to learn about a prevailing phenomenon. For example, being told about the healing plant during day-to-day chores (e.g. herding cattle, playing African games), seeing things happening (e.g. an Elder attending to a patient), and singing (the baboon and tree songs) among others.

Similarities and differences between the teaching and learning environments of western science and that of Tsime knowledge open up two integrative opportunities. Firstly, the natural environment is found in both the science curriculum and Tsime knowledge. This common learning environment implies that a science phenomenon, such as an animal or plant behaviour, can be taught from both the western and indigenous perspectives within the natural environment. The curriculum also guides the teaching and learning of phenomena within the natural environment. This teaching is done from western science pedagogical frameworks. For example, under the syllabus "Unit A: Learning to be a scientist" topic, learners are expected to conduct several experimental investigations in groups. These approaches emphasise learner centred, hands-on and group work approaches. Learners are to both talk about their observations and record them in writing. The natural environment then, as a learning and teaching environment, opens more commonalities to indigenous knowledge learning approaches.

In their natural setting, Tendera people, including children, learn through doing or participating (hands-on) and stories, songs or poems, verbal and symbolic interactions in group settings (group work). Their indigenous inquiry is embedded in these modes of teaching and learning and requires introspection. However, they record their knowledge in their minds rather than in writing. These similarities create integrative opportunities from which common phenomenon can be taught from the two alternative perspectives, western science and the Tsime knowledge. Orality, as a mode of knowledge transmission, implies both the archiving and gaining modes of indigenous knowledge (Aikenhead & Ogawa, 2007). This is one other aspect that distinguishes indigenous knowledge from western science. Western science exists in written format. In classroom settings, western science is transferred through both reading and oral communication. However, unlike the indigenous orality, where transfer starts and ends in oral forms, the western modes of knowledge transfer extend oral communication to documentation. This documented knowledge in textbooks and journal articles serves as both learning and teaching references and guides for science teachers. Arguably, these complement each other in a number of ways that would enable Tendera children to establish the differences and similarities between their own ways of knowing and that of western science. This will also instil in them a sense of appreciation for both knowledge bodies. In addition, this complementary opportunity, if harnessed, holds potential for Tendera children to enhance their observation skills and support their learning within the Tsime enterprise. The natural environment, as a common learning environment to both Tsime knowledge and the science classroom, creates an opportunity for integrating Tsime pedagogical approaches with the western oriented curriculum.

Secondly, the western science teaching environment, the laboratory, is contrived and differs from the natural environment where the Tsime knowledge is taught and learnt. This limits learning by excluding the appropriate natural environment for learning about Tsime aspects. As argued before, this exclusion creates an environment inclusion opportunity. Integration from this exclusion perspective of Tsime knowledge learning supporting environment, means extending classroom activities to the natural environment or community of Tendera.

7.4 Purposes for learning

Learning is an integral part of each knowledge system. This section compares the purposes for learning western classroom science and those for learning Tsime knowledge.

Western science purposes are captured in the ZJC science syllabus, Excerpt 7-4 below illustrates the preparation for higher academic and science career related goals of the Junior Certificate level classroom science in Zimbabwe.

> **Excerpt 7-4:** Academic and career preparation goals
>
> This syllabus is designed to cover the first two years of secondary science. It provides a basic course in science and suitable preparation for the study of "O" level science subjects … aims to equip pupils with scientific skills which will be of long term value in an increasingly technological world (ZJC Science syllabus, 1993, p. 2).

Three purposes of learning science at ZJC level can be drawn from Excerpt 7-4 above. Firstly, learners are expected to gain basic western scientific knowledge and skills. In addition, learners are expected to start developing appropriate values needed for western scientific enterprise. This learning purpose is drawn from an objective statement: "to develop attitudes of accuracy, objectivity, integrity and enquiry" (ZJC Science syllabus, 1993, p. 3). According to the hepta model of knowledge model, the development of western scientific skills is rooted in learning the processes of science. The acquisition of scientific knowledge comes from learning about the product knowledge, that is, the concepts, topics, facts, and equations of science. The syllabus guides the subject matter to be taught from the content column (see section from ZJC science syllabus in Appendix G.) The development of western scientific values comes from an understanding of the western scientific paradigm (see section 2.3.3 and 2.3.4, p. 138) which is acquired through learning about who the scientists are and what they do. The introduction "Unit A: Learning to be a scientist", pursues the goals of western scientific basic skills, knowledge and values. An understanding of what western scientists do, that is, how the western scientific enterprise generates scientific knowledge, is implied in this Unit A. All this is done as a way of laying a strong foundation for taking sciences at higher academic levels, which, in turn, will channel these learners into future participation in the western scientific and technological enterprises. This goal is further reinforced in the Science Technolology and Innovation policy (2012) that emphasises education as the foundation for the development of skilled personnel for participation in western science and technology. This is brought out in the following Excerpt 7-5.

Excerpt 7-5: Preparation for science and technology related careers

> Develop innovative ways of bringing scientific and technological contributions to all developmental efforts done at both individual and national levels … Development of skilled human resources has its foundation in education which begins at primary school level and is strengthened at the secondary and tertiary levels (Science, Technology and Innovation, 2012, p. 3,5).

The phrases and words in the purpose statements in Excerpts 7-4 and 7-5 above, such as: a basic course, preparation for, long term value and foundation, reveal a hierarchical structure of learning science for future career purposes. This is elaborated in the statement: "Development of skilled human resources has its foundation in education which begins at primary school level and is strengthened at the secondary and tertiary level". This aligns with the general structure of the education system of Zimbabwe (see section 3.5.1, p. 97). The provision of basic scientific knowledge and skills begins in primary school and proceeds through secondary school levels that start at Junior Certificate level and feed into the academic ordinary and advanced levels respectively. The children grow up from one level to the next until they are ejected as adults into science or technology related career fields. The use of the knowledge comes at a later stage after schooling. According to the curriculum documents, the general purpose of ZJC science education, therefore, appears to be to prepare a person for western scientific skills, values and thoughts appropriate for future participation in various western scientific communities.

We have already seen from the forgoing discussions that classroom science is envisioned as a preparatory phase for "potential scientists" and potential workers by teaching learners to think like western scientists (Costa, 1995). According to Aikenhead (1996), pursuance of such objectives accords classroom science the responsibility of enculturing indigene children into western science. Aikenhead further observes that enculturing classroom science has assimilative purposes. Such a purpose, Aikenhead (2001) argues, forces teachers and learners to abandon their indigeneity at the boundary between their community and school as they enter into the classroom.

Most indigenous scholars (e.g. Battiste, 2002; Smith, 1999) argue against assimilative approaches to education as they view them as a continuation of the colonisation of their indigenous knowledge. Instead of basing the learning and teaching of science on assimilative purposes, Aikenhead (2001, p. 343) proposes bringing "western science into the student's

worldview rather than insisting that students construct a worldview of a western scientist". The point stressed here is that indigenous learners, like the Tendera children, take to school the indigenous knowledge they gained through community teachings, which are different from that of western science. But the curriculum currently being western science oriented is not allowing these children to introduce their indigenous systems of knowing into their science learning. Rather, they are forced to abandon and discontinue their indigenous ways of knowing as they start learning new knowledge of western science through new learning approaches. This discontinues learning in the community as the learners begin to learn new things.

It misaligns classroom science to community knowledge. This misalignment is yet another opportunity for integrating the survival function goal of the Tsime knowledge in the syllabus. This can be fixed by formulating purposes of teaching in ways that enable pupils to understand the world from both worldviews. This resonates well with the goal of double visioning (see section 2.5.3, p. 68). By so doing, the incorporation of Tsime knowledge into the curriculum is achieved. This is because "what to teach" and "how to teach it" are driven by the defined purposes of teaching and learning.

Though the purposes for learning science at ZJC level discussed above generally differ from those of acquiring Tsime knowledge, there are some ways they converge. As we have already seen in Chapter Six, learning in the Tsime knowledge system serves a "survival" function, rather than being a preparation for future careers in science. This explains why in the Tsime enterprise learning is embedded in real-life activities and across their wheel of life. The learning is an integrated life experience that is embedded in the community activities of using plants for healing, construction of this knowledge and generational exchanges. In contrast, classroom science focusses on learning the knowledge already developed and using it later. The curriculum objective 2.2 states: "to acquire scientific knowledge and skills that are relevant to the study of science and are useful in everyday life" (ZJC Science syllabus, 1993, p. 3). The statement "useful in everyday life" connotes an immediate application of the western science knowledge gained in the classroom to real community life. However, in essence, this statement has implications for classroom science as a commodity that is acquired in decontextualised classroom environments outside community life. The knowledge is then applied in life in the community after it has been learnt. Yet, Tsime knowledge, like any other form of indigenous knowledge, is defined as "real life from a monistic, holistic and relational worldview, therefore, it is experienced rather than merely get

applied to real life" (Aikenhead & Ogawa, 2007, p. 584, emphasis original). Tsime knowledge, as real life, gives the sense that, in the community of Tendera, learning is not separated from life. It is incorporated in Tsime knowledge production, including modifications, transfers, exchanges and uses that take place continuously as life progresses.

Another point of departure between the purposes of classroom science and those of Tsime knowledge emanates from their knowledge sources. Classroom science draws its content and pedagogy from the already developed body of knowledge (Òtúlàjà et al., 2011). Therefore, the fundamental purpose of classroom science is for children to learn (see Excerpt 7-1 above). Yet, in the Tsime enterprise, at times, knowledge is drawn from generational constructions and modifications evolving from past and present experiences and is tested in the continuing process of living. Therefore, the fundamental purpose of learning about Tsime knowledge is to be healthy and live a good life. Learning is embedded in lived experiences. The solving of real life health problems and the prevention of ill health in the community are goals inherent in this survival function. This is in contrast to the learning of sciences in schools in order to work in science related fields, such as becoming a western medical doctor. The Tsime knowledge is part of everyday life that involves its development, sharing and its application for immediate and future survival. Children's learning of Tsime knowledge in the community is a practical and lived experience. It gives the learners of Tsime knowledge that is immediate and creates a satisfying life that makes learning relevant and meaningful. The preparation for the world of work does not offer these immediate results, therefore its relevance is, in the end, for those who will learn western science to rise up the educational ladder.

Tsime knowledge is anchored on the community values of collectivism, sacredness, reciprocity, and respect (see section 4.4.4, p. 137). The learning of Tsime knowledge entails adhering to the values of living together presumed by the totemic community worldview (see section 4.4, p. 4.4) and the *Unhu* philosophy (see section 2.3.3, p. 34). Within the totemic worldview, the building of community values enables an individual to live with others, for others and through others (see section 6.1, p. 187). This is all done for the survival of the entire community rather than for survival of the self. The purpose of Tsime knowledge learning is to produce a community character or identity and to gain basic health knowledge and skills appropriate for individual, family and community survival.

The analysis above reveals differences between the learning purposes of classroom science

and western science systems. The curriculum was designed from a western science perspective with the ultimate goal of preparing learners for the world of work. Teaching Tsime knowledge in the curriculum relates to the real life of children in their community of Tendera. Learners must be able to cross the boundary from practical knowledge to that of theoretical knowledge that prepares them for the world of work. It has to allow learners to continue with the knowledge they bring into the classroom from the community by accommodating new ways of knowing. In short, this describes integration in terms of continuity and accommodation.

Figure 7-1 below shows the three categories from which the integrative opportunity analysis of the aims and objectives (purpose) statements extracted from the ZJC science syllabus as shown in Excerpt 7-6 below. Twenty-one (21) syllabus purpose statements were analysed in search of integrative opportunities. They came to 21 purpose statements because I divided aim 2.4 into two and also objective 3.11 into two. Basically, all these purpose statements were formulated for the teaching and learning of western science presented in the syllabus therefore they are all aimed at western classroom science. Logically, this category provides an alternative category which I labelled, exclusively Tsime knowledge and which I coded 0. This is because the syllabus was not designed with the incorporation of Tsime knowledge in mind.

All the 21 classroom science purpose statements were formulated for western classroom science. For this reason, they are all coded 1 in Excerpt 7-6 below. However, some are stated in ways that can accommodate the teaching of curriculum aspects from a Tsime knowledge perspective. This reasoning then divides the main western classroom science oriented category into two subcategories. Firstly, the exclusively western oriented classroom science contains purpose statements that connote western classroom science. These purpose statements are coded 2 in Excerpt 7-6 above. The purpose statements coded 3 fall under the second category I refer to as Tsime knowledge accommodating, in recognition of their ability to offer integrative opportunities. These codes are shown in bold in Excerpt 7-6 above to indicate the category to which the statement was allocated.

Excerpt 7-6: Learning of science aims and objectives

2. AIMS- The aims of the syllabus are to enable pupils to:

2.1 become scientifically literate**;(1; 2)**
2.2 acquire scientific knowledge and skills that are relevant to the study of science and are useful in everyday life **(1; 2),**
2.3 develop attitudes of accuracy, objectivity, integrity and enquiry **(1; 3)**
2.4 develop an understanding of (a) life processes **(1;3)** and (b) scientific phenomena **(1; 2)**
2.5 develop an appreciation of an interest in protecting and conserving the environment **(1; 3)**
2.6 recognise the usefulness and limitations of science and scientific methods and appreciate their applications **(1; 2)**

3 GENERAL SYLLABUS OBJECTIVES- Pupils will be able to:

3.1 demonstrate knowledge of scientific terms and concepts **(1; 2**)
3.2 demonstrate an understanding of systems and processes in living organisms **(1;3)**
3.3 demonstrate an understanding of environmental issues **(1; 3)**
3.4 use a variety of scientific instruments and apparatus safely and efficiently **(1; 2)**
3.5 determine scientific quantities **(1; 2)**
3.6 describe observations, record results and draw conclusions from experiments **(1; 3)**
3.7 use information to identify patterns and trends and draw conclusions **(1;3)**
3.8 make reasonable predictions from information given **(1; 3)**
3.9 give explanations for phenomena, patterns and relationships **(1; 3)**
3.10 apply scientific principles in solving problems and in understanding new situations **(1; 2)**
3.11 present and interpret information in (a) oral, written, symbolic **(1;3)** and (b) numerical form **(1; 2)**
3.12 draw a scientific diagrams in two dimensions **(1; 2)**
3.13 carry out simple calculations **(1; 2)**

(ZJC Science syllabus, 1993, pp. 3–4)

Figure 7-1 below shows the distribution of these syllabus purpose statements in the three categories of exclusively western classroom science, Tsime knowledge accommodating, and exclusively Tsime knowledge. The count axis relates to the number of statements within the category.

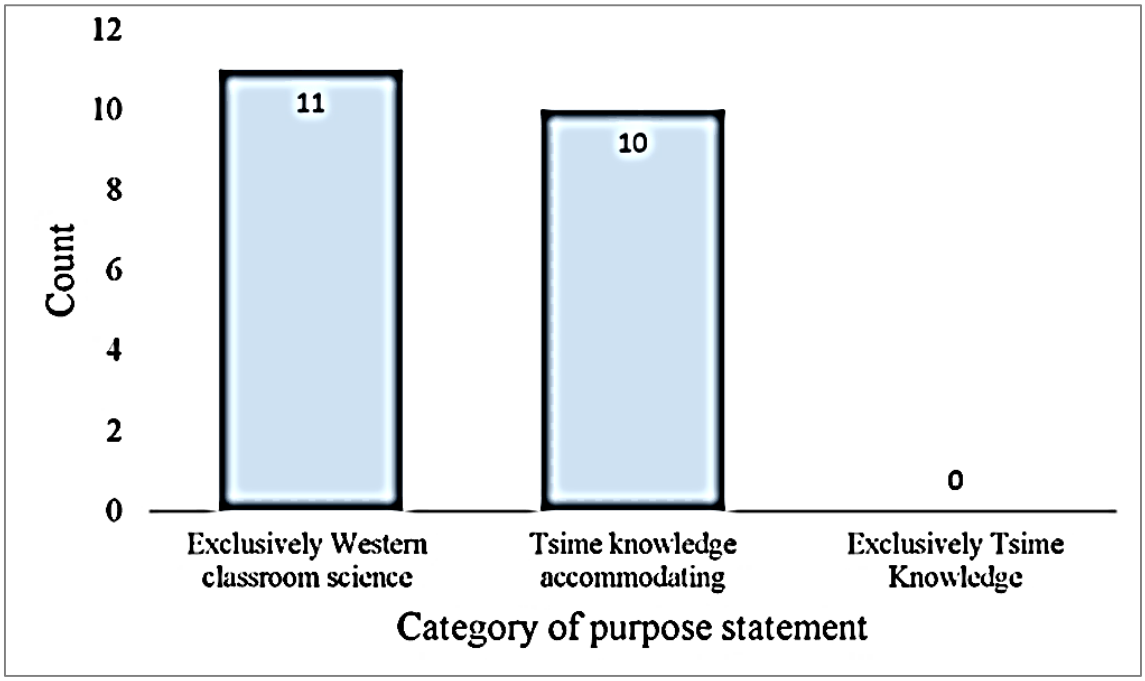


Figure 7-1: Syllabus purpose statements' proportions

As Figure 7-1 is showing, eleven of the purpose statements in Excerpt 7-6 above were interpreted to be entirely western oriented from terminology that speaks of western science. For example, aim 2.1 states: to enable pupils to "become scientifically literate". This western orientation implies the total absence of teaching that aspect from a Tsime knowledge perspective. It bars learners from enhancing their indigenous knowledge proficiency through classroom science. But, as I have illuminated in section 7.1 above, the absence of the Tsime knowledge aspect may be indicative of an alternative conception. If this alternative conception is established from the Tsime knowledge documented in Chapter Six, this then creates an integrative opportunity. For example, instead of confining learning to the understanding of scientific literacy teaching, the teachers can consider broadening the objective to enable learners to understand cultural "scientific" literacy. Cultural scientific literacy then becomes a common purpose for both knowledge systems.

However, ten of these purposes, though specifically addressing western orientation, are stated in a way that is accommodative of some aspects of Tsime knowledge. There is, therefore, a possibility of integration in the curriculum. For example, objective 3.3, to "demonstrate understanding of environmental issues" such as conservation, can be understood from both western science and Tsime knowledge perspectives. The Tsime knowledge conservation strategies include taboos and ritual healing (see section 6.2.3.5, p. 215). This indigenous content can be taught in Unit E.1 under the content theme: "Conservation of natural

resources: water, soil, wildlife, plants and minerals" (ZJC Science syllabus, 1993, p. 15). The objective 3-9 of giving "explanations for phenomena, patterns and relationships" is another example that accommodates both indigenous knowledge and western science. This point is further developed in the ensuing Chapter Eight. When this indigenous content is taught, learners, as children of Tendera, are bound to see their participation in the curriculum as relevant, as it has a direct bearing on their everyday lives. When these aspects are also taught from a western science perspective, it brings comparisons that may result in these pupils comparing the two knowledge systems that reinforce each other. By so doing, it allows the pursuit of the double visioning goal of integrative science. It is left to the teacher to decide what suitable content to include that can be taught from the perspectives of both knowledge systems. However, as I have already pointed out in section 7.2 above, this depends on the teachers' adaptability to both the teacher authority and facilitation roles.

7.5 Content of knowledge

The classroom science model of the culturally aligning classroom science (CACS) theoretical framework (see section 2.2.1, p. 29) guiding this study, refers to content knowledge as the knowledge aspects in the curriculum being taught or ought to be taught within classroom contexts. From Lawton's (1975) curriculum meaning and from a cultural point of view, content describes the subject matter selected from the broader knowledge system. Classroom science content in Zimbabwe, like elsewhere in Africa, has been generally drawn from the western science literature. Integrative classroom science entails content knowledge drawn from western science and indigenous knowledge, such as Tsime knowledge. The syllabus then should depict these two components, that is, western science oriented content knowledge already ascribed to curriculum and that ascribed to the Tsime knowledge. Ideally, for this study, the content of the classroom science needs to constitute the aspects of knowledge drawn from all the hepta knowledge dimensions of both western science and Tsime knowledge. This is what is required by the E3P knowledge model of the CACS theoretical framework (see section 2.2.1, p. 26). However, in reality, the knowledge aspects that form classroom science content can be found in the syllabus. This then warranted the analysis of the syllabus content. The content for analysis was drawn from five units that are shown in Table 7-2. These units were selected for analysis because they connected with the Tsime knowledge aspects documented in Chapter Six. For example, the wheel of life and the knowledge of community.

Table 7-2: Syllabus units' analysed

Unit	Unit topic
A	Learning to be a scientist
C	Plants and animals
E	Resources and the environment
F	Life processes
H	Reproduction
I	Health

Excerpt 7-7 below exemplifies the content analysis finding that the ZJC science syllabus emphasis is on the teaching of practical or process content. Practical, process, or procedural content is drawn from the process dimension of a particular knowledge system, like western science. It relates to the content taught to learners to develop specific process skills required for the development of a knowledge body. For integrative classroom science, the process skills are drawn from both western science and indigenous knowledge ways of developing knowledge. The focus is on how knowledge is developed and the appropriate skills the knowledge developers of that body of knowledge applied. The "how developed" and "what skills employed" are both integral components of the process content.

> **Excerpt 7-7:** A syllabus focus on practical or process content
>
> This unit (Learning to be a scientist) is concerned mainly with the acquisition of scientific skills such as **observing, recording, measuring and presenting** data. Sufficient practical experience should be given to enable the pupils to **handle apparatus, chemicals, plants and animals safely** and with confidence … The topic in this unit should be integrated throughout the whole syllabus (ZJC Science syllabus, 1993, p. 6).

The term "should" in the statement that "the topics in this unit **should** be integrated throughout the whole syllabus" emphasises the teaching of investigative content across all units of the syllabus. The western scientific skills to be developed in learners emphasised in the syllabus are listed in the purpose statement in Excerpt 7-7 above as observing, recording, measuring and presenting data and handling apparatus, chemicals, plants and animals safely. Notably, all these are applicable to Tsime knowledge as well. This is because they use human senses that are a universal characteristic of all humans irrespective of their cultural

backgrounds. It is not the skill (e.g. observation), per se, that determines the characteristic of knowledge system processes, but rather the interplay (the relationship) between the skills, the context and the paradigm. For example, some people of Tendera claimed that their observation abilities were a gift from the ancestors and grounded in the guidance provided by their ancestors. This explains why some people can observe more than others (see section 6.3, p.218). This explanation clearly brings out the monistic and holistic thought system of the people of Tendera that is common to indigenous knowledge people. Other than this, observation skills demanded by both systems of knowledge are the same. The difference lies with the environment where such observations are conducted. The Tsime knowledge observations are conducted in the natural environment and those of western-oriented classroom science largely happen in school laboratories. This presents an integrative opportunity as discussed in section 7.1 above.

In both knowledge systems, classroom science and Tsime knowledge, recording, measuring and presenting data are pre-requisite skills to be developed. The difference is shown in the ways these skills are applied. In the Tsime knowledge system, observed data are qualitatively measured and generated. They are recorded in various oral forms inclusive of incantations, rituals and rites, oral art (songs, poems, and metaphors), intuition and use. All this knowledge is archived in human minds. In contrast, the classroom science has drawn the skills of quantitative measurement and recording of results in writing. The classroom science observations are reported and archived in schoolbooks. Being an oral form, Tsime content is not found in the syllabus. Its incorporation into the syllabus entails writing it down to conform to the classroom contexts. The opportunity for integrating it into the classroom science lies in the difference between the oral and the written form. Integration here entails writing the content aspects of the Tsime knowledge for classroom science. Such content needs to include the various versions of the orally observed knowledge I have listed above and that has emerged in the Tsime knowledge Chapter Six. Doing this fulfils the inclusion of indigenous knowledge in the classroom context multicultural approach to science arguments (see Aikenhead, 2001; Ogawa, 1995; Snively & Corsiglia, 2001).

The teaching of process skills goes along with that of developing the western scientific values needed to study nature. This is indicated by the statement “to enable the pupils to handle apparatus, chemicals, plants and animals safely and with confidence” in Excerpt 7-7 above. Other values listed in aim statement 2.3 are to “develop attitudes of accuracy, objectivity, integrity and enquiry” (Excerpt 7-6 above). Implicit in the teaching of these values are both

the paradigm content from an axiological dimension point of view and enterprise content from the members' attributes appropriate for operating within or belonging to the knowledge enterprise. Confidence, accuracy, integrity and inquiry are "habits of the minds" (Barnhardt & Kawagley, 2005, p. 16; Stephens, 2000, p. 11) common to indigenous (as represented by Tsime) knowledge and western science in classroom science. The value of integrity relates to honesty and that of enquiry calls for the values of inquisitiveness, perseverance and open-mindedness observed as common to indigenous knowledge and western science (Stephens, 2000), with which scholars, like Barnhardt and Kawagely (2005), concur. Whilst the values of honesty, perseverance and inquisitiveness were affirmed by participants in Tendera community, that of open-mindedness is contrary to their value of secrecy and sacredness. In addition, the value of subjectivity was more apparent in their healing enterprise than that of objectivity emphasised in the western oriented classroom science. As already pointed out in the earlier sections, both the differences and similarities in values indicate opportunities for integrating the value systems of Tsime knowledge system. This implies extending the value system beyond the boundaries of those acknowledged systems in the western science to embrace that of Tsime knowledge. But in doing this, teachers need to be aware of the possible tensions inherent in the contrast between open-mindedness and those of sacredness and secrecy.

The ZJC science syllabus is explicit on western science oriented process and product content and implicit in the paradigmatic and enterprise content. For example, the topic "learning to be a scientist" puts the focus on the teaching and learning of process content, but the paradigm and enterprise content are implied in the focus on a western scientist. This ZJC science syllabus' process and product orientation is reflected in purpose statement 2.2 that requires pupils to "acquire scientific knowledge and skills that are relevant to the study of science" (Excerpt 7-6, p. 254). The scientific knowledge relates to content drawn from the product domain of western science. It is the product (factual) content such as the chemical composition of substances and the equation of photosynthesis. The scientific skills allude to the process (procedural or skills) content and, as already discussed, draw from the process knowledge dimension of western science. These perspectives of knowledge are important in understanding how syllabus content statements were codified as process and product knowledge.

One hundred and seventy two (172) content statements of the syllabus were selected from the content and notes and activity column of the syllabus (see Appendix G) and analysed. On one

hand, content statements like “change of state, simple experiments with permanent magnets and electrostatic experiments with plastic objects and paper” (Unit A1, p. 6) were allocated to the process category because they involved experimentation. Those such as “A discussion on the prevention of pregnancy” point to a focus on theory therefore were allocated to the product content category. Figure 7-2 below presents the analysis of content statements as either explicitly connoting product or process, or paradigm or enterprise. The analysis of these 172 syllabus statements revealed that all of them (100%) represent western science based content. This is not surprising because the syllabus was designed with western science in mind and content was drawn from three western science disciplines: physics, biology and chemistry.

This confirms Zimbabwean scholars’ (Makhurane, 2000; Shumba, 1999) lamentation that the science curricula in Zimbabwe are western science orientated. Figure 7-2 shows that, though western science also has an enterprise, and paradigmatic knowledge, the syllabus content is product (68%), and process (32%) oriented only. No statements were explicit on enterprise and paradigm content. This syllabus characterisation is important here to provide a comparative basis with the nature of knowledge in Tsime.

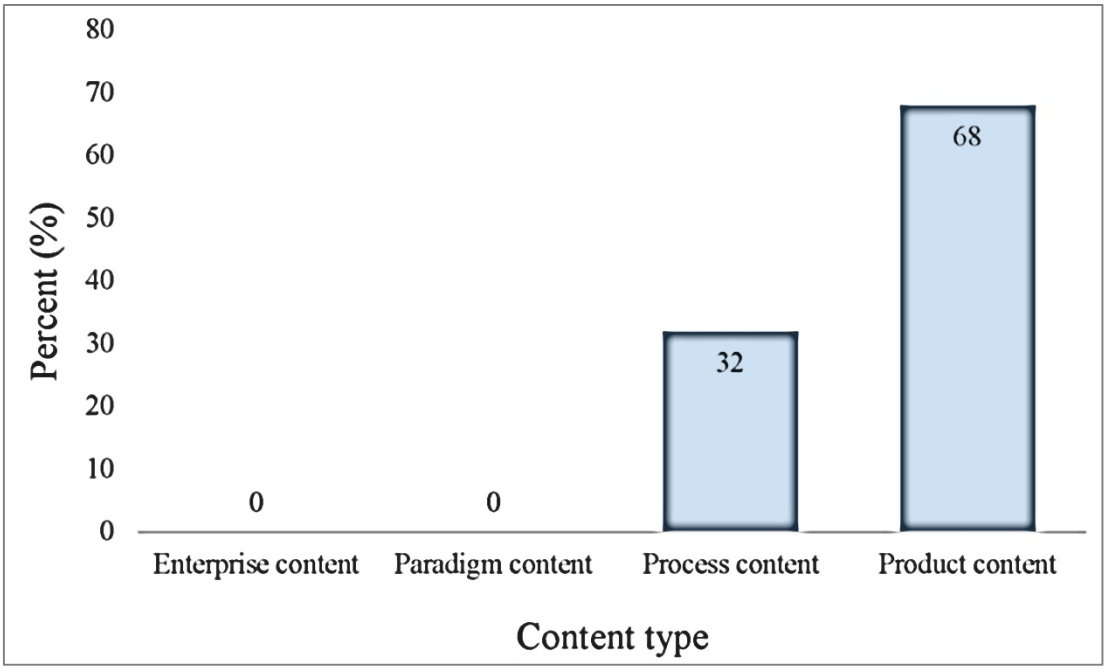


Figure 7-2: Product-process oriented nature of syllabus

The syllabus content’s omission of the paradigm and enterprise content can be explained from the reductionist nature of western science (Aikenhead & Ogawa, 2007) which allows for knowledge compartmentalisation (Barnhardt & Kawagley, 2005) which manifests in two

ways. These are: the content is drawn from the disciplines of chemistry, biology and physics and organised into teaching units A to J (see The 1993 ZJC science syllabus contents, Table 3-3, p.106). This western science reductionist and compartmentalised feature shown in the syllabus contrasts with the holistic nature of indigenous knowledge exhibited in the Tsime knowledge that calls for the inclusion of all its facets into the curriculum in order for them to be representative and reflective of the larger Tsime knowledge system from which they would have been selected. Thus, Tsime content needs to be inclusive of the process, product, and paradigm and enterprise knowledge. Leaving out some, such as the enterprise and paradigm content, as in the case of western science, leads to its fragmentation that is contrary to a holistic characteristic. The integrative opportunity here arises from the holism of Tsime content that is an alternative to that of the western science in the curriculum. So the inclusion of the paradigmatic and enterprise knowledge of Tsime knowledge in the syllabus drags with it the teaching of the comparative western science aspects. This argument, therefore, is suggesting incorporating in the syllabus the paradigm (nature) and enterprise content of these two knowledge bodies.

The syllabus topics bear clear and explicit western science content. For example, unit I.2 (Human and parasitic diseases) focuses on bilharzia and malaria, their modes of transmission, symptoms, prevention and treatment. This is followed by the coverage of the life cycle of the bilharzia parasite. Statements like "correct use of chloroquine in the treatment of malaria to be discussed" and the "treatment is **restricted** to visit to clinic or hospital for medical help" (p. 22) reinforce the western science based content of this syllabus. But, in Tendera, the people manage bilharzia through the use of their local community plants. For example, roots of *mugaranjiva* (*Gymnosporia senegalensis*), and *muremberembe* (*Cassia abbreviate*) were used in the community for treating bilharzia (see Appendix J: Record of healing plant and ailments). This alternative Tendera treatment approach of bilharzia presents an integrative opportunity in terms of content. Such an opportunity can be fixed by the inclusion in the syllabus of the comparative indigenous ways of managing disease.

The ZJC science syllabus content analysed does not explicitly mention anything about indigenous knowledge. This is not surprising because it was not designed with the teaching of indigenous knowledge in mind, but rather with that of western science concepts. However, 85 (49%) of syllabus content statements are neutrally formulated and therefore are suggesting that such content could also be taught from the perspective of Tsime knowledge. For example, Tsime content could also be taught in Unit C.3 (interdependence of plant and

animals). Including the Tsime knowledge under this topic alludes to teaching about medicinal dependence of animals on plants (see Table 6-4, p 238). The dependence of humans on plants that heal from non-human aspects, including spirits, of the community, could also be taught/learnt (see section 6.3, p. 6.3). Interdependence could also be taught-learnt under community resources from both indigenous and western science perspectives. The syllabus suggests placing this Tsime content in unit E (Resources and the environment). Sub unit E.1 (natural resources) focuses on the identification of these resources, their classification as renewable and non-renewable, and how to conserve them. Taboos, rituals and respect for resources as sacred are some of the Tsime content that speaks to conservation from an indigenous perspective. However, such content is metaphysical in nature and extends the focus on the physical content of the syllabus. Again, this difference presents another opportunity to include the Tsime content into the syllabus that can be compared to western science-based approaches.

The content on interdependence is also inferred from unit H (reproduction). For example, pollination and, in turn, fertilisation and reproduction in H.1 (sexual reproduction in plants) life processes are dependent on wind and insects as agents of pollination. In the Tendera community, this concept of dependency can be extended to animals' "dependence on medicinal plants for their health upkeep [and] knowledge of their use". It can be argued that it is through these life processes that other plant parts (seeds and fruits) of medicinal value are produced. Moreover, after the dispersion of seeds, in which animals play a role, seed germination and growth into a new plant take place. The process ensures the continuous availability of medicinal plants.

Eighteen (18) of the forty-three (43) syllabus statements that were drawn from unit H (Health) suggested content that could be taught-learnt within the Tsime framework. In section 1.1, the syllabus guides teachers to cover "individual and community health" from the perspective of "health as a state of physical, mental and social wellbeing, not just absence of disease" (p. 22). Such a statement encapsulates the possibility of teaching-learning about health from both the modern medicine and Tsime perspective. Tsime explicitly shows the embodiment of indigenous knowledge and practices of plant healing across the life wheel in Tendera. This indicates that such knowledge can be placed in Units on life processes (F) and reproduction (unit H). For instance, in the content of sub-sections H.2 (sexual reproduction in humans), H.3 (puberty) and H.4 (menstrual cycle), can be condensed to read "human life cycle". Into such a topic, the health management content at each stage can be incorporated.

This creates room for teaching-learning about health issues across the life span from both perspectives of western science and Tsime.

Evident from the above discussion are several places in the syllabus where Tsime could be taught-learnt. They are indicated by integrative opportunities that, from the differences between the two systems, lie in the 51% statements that are oriented to western science in the syllabus. The analysis has shown that, for almost every western science content form, there is an alternative Tsime content. The remaining 49% are neutrally presented and hold alternate integrative opportunities. However, the syllabus places for integrating Tsime knowledge are scattered across the units as you might also have noticed from the above discussion. This is mainly because of the compartmentalised nature of western science that allowed this syllabus structure. However, if Tsime knowledge aspects are to be integrated in such curricula, this scattering might conflict with its holistic nature. Such a scenario does not help in developing the understanding of the nature of Tsime for both teachers and learners. This dialogic analysis, therefore, is suggesting the re-structuring of this syllabus in a way that creates the proper context for teaching-learning of a phenomenon from both perspectives. Such a suggestion is not easy to accomplish, thus acknowledging that the task to integrate indigenous knowledge into classroom science is a complex one. But it is impressed in the syllabus methodology statement "[to] give guidance, some practical activities are provided in the notes and activities column. The suggested activities and examples are in no way exhaustive and teachers are encouraged to use their own examples" (ZJC Science syllabus, 1993, p. 5).

The above dialogic analysis between the syllabus and the Tsime leads me into re-examining it, at this point, for purposes of summarising the linkages in Table 7-3.

Table 7-3: The Tsime content that could be integrated into the syllabus

Unit	**Syllabus**	**Tsime**
A.1-4	Learning to be a scientist	Learning to be an indigenist
A.1, C.3, E.1, E.5	Resources in community	Resources in community
E.1, E.5, C.4	Conservation of resources	Sacredness and conservation
F.2, H.2-4, 1.1-4	Human life cycle	Human life wheel
1.1-4	Scientific Treatment of disease	Holistic healing
I.1-4	Modern medicine health	Indigenous perspective of health
All units	The western scientist	The indigenous knowledge holders
All units	Nature of science	Nature of indigenous knowledge

The terms “indigenist” and “scientist” as used in Table 7-3 show the different science ways of knowing rooted in their respective indigenous and western scientific thought systems. The word “scientist” as used in the ZJC syllabus connotes a professional who develops knowledge through processes grounded in western scientific cultures. In contrast, I borrowed my use of the term “indigenist” from Martin and Mirraboopa’s (2009) “indigenist” frame to research that simply alludes to and/or points to the existence of indigenous inquiries. This derivation comes from the argument that the focus of learning to be a “scientist” is on instilling in indigenous and western (non-indigenous) children with the content, values, and processes as well as the language skills involved in western scientific knowledge production through schooling. This implies that learning to be an “indigenist” has to aim at instilling or/and enhancing in indigenous and/or western children, through institutionalised schooling, a cultural knowledge such indigenous values, processes and language skills involved in indigenous knowledge production.

7.6 Language of knowledge and transfer of knowledge

The curriculum recognises the ethnic cultural diversity Zimbabwe holds. English and Shona are among the sixteen officially recognisable languages in Zimbabwe as described in the following Excerpt 7-8.

Excerpt 7-8: Multi-language society

> The following languages, namely … English … Shona are the officially recognisable languages of Zimbabwe … The state and all institutions of the government at every level must … ensure that all officially recognisable languages are treated equitably; and take into account the language preferences of people affected by government measures or communications … promote and advance the used … must create conditions for the development of these languages (Constitution of Zimbabwe, 2013, section 6).

This constitution also instructs institutions (e.g. schools) to give credence to each of the languages in a just and fair way. It emphasises three ways of achieving this language endeavour. Firstly, by considering local people’s preferences of language for communication. Secondly, through promotion of indigenous language use in its local context, and thirdly, by creating spaces for each indigenous language’s development. This alludes to the language supporting the Tsime space. The indigenous language position in Zimbabwe is not surprising. It is in line with the crucial role language plays in cultural identity and power creation for its knowledge and people who speak it (Metallic & Seiler, 2009). This language position also

supports the Zimbabwean government's integrative classroom science endeavours. In fact, it has been well acknowledged in literature that there is no knowledge without a language and culture. Given the notion of a school as a miniature society, it ideally follows that a school in a local context should mirror the larger community in which it is located. In terms of language, this has not been the case with Zimbabwe. Zimbabwean schools are more representative of the inherited colonial systems rather than the indigenous communities in which they are located (see sections 3.4, p.96). It is therefore not surprising that legislation on the language position has recently been reviewed in an attempt to harmonise languages in curriculum spaces to accommodate the languages of indigenous communities.

The constitutional position with regard to language, which I have discussed above, reinforces that of the amended section 62 of the Zimbabwe Education Act 12 of 2006. Excerpt 7-9 below shows the Zimbabwe Education Act (2006) position on language teaching and use of languages as instructional media in schools.

> **Excerpt 7-9:** Language teaching and their instruction use
>
> All the three main languages of Zimbabwe, namely Shona, Ndebele and English as the officially recognisable languages of Zimbabwe, shall be taught on an equal time basis in all schools up to form two level. In areas where indigenous languages other than those mentioned are … spoken, the Minister may authorise the teaching of such languages in schools in addition to those specified. Prior to Form one, any one of the languages referred to … may be used as a medium of instruction depending upon which language is more commonly spoken and better understood by the pupils (Zimbabwe Education Act, 2006, section 12).

A holistic picture of the curriculum language position both as a subject taught in schools and as a medium of classroom communication is inferred from Excerpt 7-8 as read with Excerpt 7-9 above and Excerpt 7-10 and Excerpt 7-11 below.

Excerpt 7-10 from Secretary's Policy 77 (2006) gives insights into the subjects offered at ZJC level.

Excerpt 7-10: Languages in the science curricula

> In line with the recommendations of the 1999 Presidential Commission of Inquiry into Education and Training (Nziramasanga 1999), Ministry has adapted and is implementing a two-pathway education structure with effect from 2006. The two pathways are: the general or academic …, and the skills (i.e. the Business or Commercial or Technology or technical-vocational) … The two-pathway Education structure is meant for post-Form 2 studies to cater for the learners' varying aptitudes, interests and abilities. This entails giving learners at Forms 1 and 2 levels a broad curriculum including the Sciences, Mathematics, Humanities, Languages, Business/Commercial, Technology/technical-vocational subjects (Policy Circular 77, 2006a, pp. 1–2).

The term "languages", as used within the ZJC school curriculum, represents a category of subjects. These are languages spoken and recognised as official in Zimbabwe (see excerpt 7-3). Excerpt 7-10 above gives insight on the general curriculum (subjects offered) design at ZJC level. Secretary's policy 3 (2002) compels all pupils to study five core subjects up to ordinary level. These are English Language, History, Mathematics, Shona or Ndebele, Science. In addition, pupils are given three more subjects selected from the categories of humanities, commercials and technical-vocational. This gives the pupils a total of eight subjects. It is apparent from these curriculum document guidelines that, unlike English, not all these indigenous languages are taught in schools. Rather, as shown in Excerpt 7-11 below, a selection from the Primary and Secondary Schools curriculum policy, lessons of 5 periods per week are allocated to English and at least one indigenous language, that is Shona, in the context of this study (Secretary's Circular 3, 2002). At face value, this policy satisfies the equal time basis teaching of English and an indigenous knowledge, as Zimbabwe Education Act (2006) specifies, but a close examination of this policy reveals that it prioritises English. This is because the policy directs the use of English as the medium of most subjects being taught, except where the subject itself is one of those languages which are indigenous. Reinforcing this observation is the relative time the ChiZezuru (ChiShona) is used or taught in schools in relation to English use. I calculated this proportion of time from Excerpt 7-11, using the subjects in bold that represent the general curriculum of the two schools, Deve and Gomo, as discussed in Chapter Three.

Excerpt 7-11: English and indigenous languages expected contact time

SUBJECT	**Allocated weekly contact time**	
	Periods	Hours and minutes
English	**5**	**3hrs 20min**
History	**4**	**2 hrs 40min**
Geography	**4**	**2 hrs 40min**
Literature in English, Shona or Ndebele	2	1hr 20min
Religious and Moral Education	3	2hrs
Foreign Languages	4	2 hrs 40min
Shona/Ndebele	**5**	**3hrs 20min**
Science	**6**	**4hrs**
Mathematics	**5**	**3hrs 20min**
Technical/Vocational	**6**	**4hrs**
Business/Commercial	**4**	**2 hrs 40min**
HIV/AIDS Education	**1**	**40min**
Guidance and Counselling	**1**	**40min**
Co-curricular activities	**3**	**2hrs**

(Adapted from the Secretary's Circular 3, 2002, p. 13)

Figure 7-3 below shows the use of ChiShona relative to English in teaching the subjects. Shona is allocated about 11.4% of the total time allocated to all the subjects per week. The teaching of English is allocated the same proportion of time as ChiShona. However, in 88.6% of total lesson time for all subjects, English is used as medium of instruction in the teaching of other subjects that are not Shona. This is in line with the curriculum document requirements. This makes English dominate all other knowledge spaces. The curriculum policy assumes that the language of English holds all other subjects besides Shona and that Shona does not have this knowledge in it. Thus, English is viewed as the most logical language for the teaching of subjects such as science, history and mathematics. The dominant status of English in science classrooms (see Figure 7-3 below) presents science as more favourable to learners with an English cultural background than those with indigenous cultural backgrounds. Yet studies (see Msimanga & Lelliott, 2014) apparently have revealed that indigenous languages, such as ChiShona, have the capacity to adequately convey western scientific concepts and knowledge.

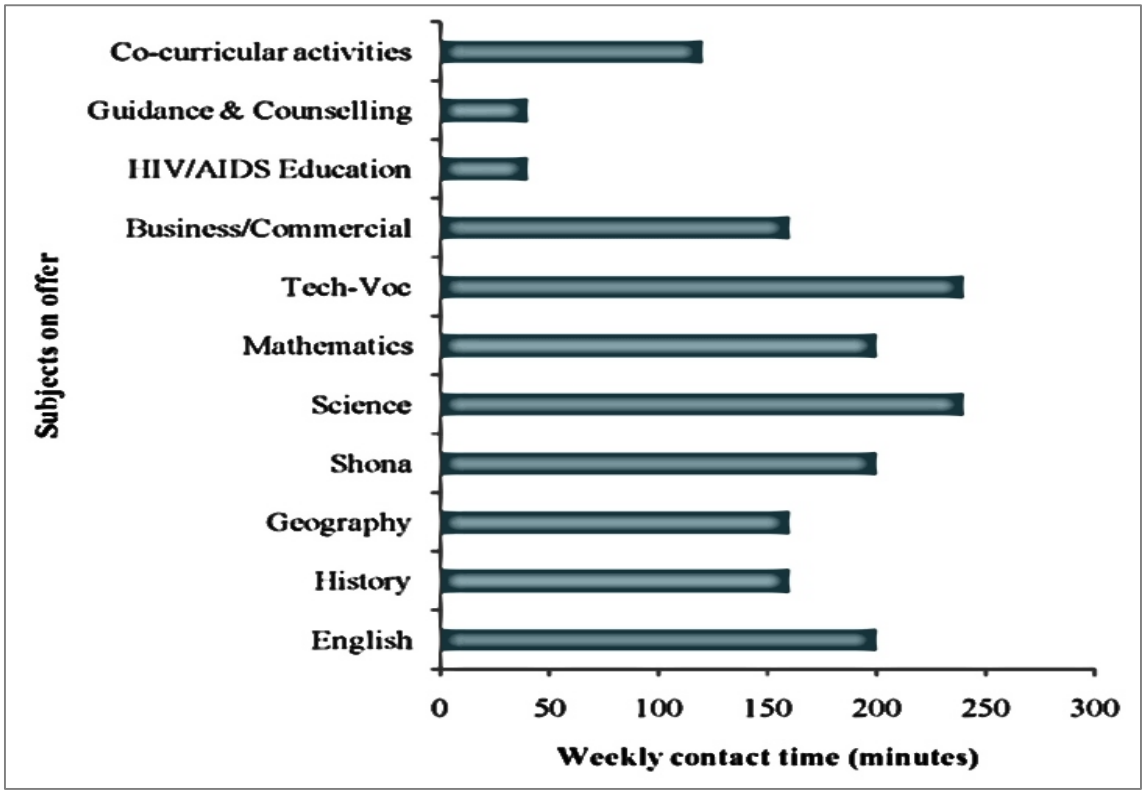


Figure 7-3: Subject weekly time allocation

Arguably, both the exclusion of ChiShona from science classrooms and the inclusion of it as a social medium of interaction fail to recognise that "African scientific knowledge" is also embedded in language itself. So the indigenous learners' interaction with science in the classroom is limited to just the use of their languages to facilitate their understanding of western classroom science, but not the learning of indigenous knowledge. As you might also have noticed in Chapter Six, the Tsime knowledge is embedded in high ChiZezuru. It follows that the use of indigenous language to mediate the learning of western classroom science is out of context. It, therefore, might not be the best approach to create the integration of Tsime knowledge into western classroom science opportunities. In fact, it might even perpetuate the western scientific culture domination over indigenous knowledge in the classroom sciences. My argument here is that teaching western classroom science in indigenous languages is not the same as the language's integration into western classroom science. It remains an approach to indigenous languages that separates them from the bodies of knowledge that they are used to express. There is no doubt that language is central to human cognition. This means the creativity of the human mind, and, therefore, knowledge development and learning (see Hungwe, 2007). It therefore follows that the minimal use of the learners "own" language in the school curriculum is not only a deterrent to their understanding of the knowledge developed in a foreign culture but to the formation of their own cultural knowledge as well.

No wonder the Nziramasanga report (1999) argued that the domination of English over indigenous languages in Zimbabwe was one of the main contributing factors to poor learning outcomes in school subjects like science. This English dominance over indigenous languages in the subject of science and others as well is apparently evident in all the curriculum documents (see Figure 7-3 above), including textbooks, for all subject areas, except ChiShona and Ndebele, which are written in English. The syllabus itself is communicated in English. It also has technical terminology of the discipline from which the unit was drawn which is non-indigenous.

The low status of ChiZezuru in the curriculum of Deve and Gomo in relation to English contrasts their relationship in the community of Tendera. The ChiZezuru dialect is central to all the cultural knowledge and activities in the community of Tendera. The Tsime knowledge was generated in ChiZezuru, particularly in its high variety form. Such high value ChiZezuru included all oral forms of communication and observations. Even in the discussion with learners and interviews with teachers, these participants revealed rich Tsime knowledge in their ChiZezuru dialect. However, their use of modern ChiZezuru (ChiZezuru mixed with other dialects of Shona and English) was inclined towards school curriculum issues or general life issues. This finding agrees with our earlier finding that participants quickly code-switch to ChiZezuru when the conversation turns to cultural issues (Mpofu, Mushayikwa, et al., 2014a). In this study, I argue that the people of Tendera are still communicating issues of cultural importance through their indigenous language and that this is largely contributing to the preservation of their Tsime despite the influences of colonialism and globalisation.

Given the above insights, I point out three main implications that should be taken into consideration in order to make the integration of indigenous knowledge into western classroom science meaningful to learners and the Zimbabwean society. Firstly, Tsime knowledge shows that indigenous knowledge has its own technical language that needs to be developed and understood. Teachers then need to learn this technical vocabulary in order to incorporate Tsime knowledge successfully into their teaching.

Secondly, Tsime knowledge terminology differs considerably from that of scientific language. It is a specialised language that is rooted in ChiZezuru, but deviates from every day ChiZezuru use. This feature is similar to that of the technical language of science communicated in the language of English. In this scenario, “third space” theory (Bhabha, 1995) becomes useful in overcoming the knowledge and language challenges presented by

their rooting in different and often conflicting paradigms. This third space theory frames communication in multiple languages. This means that ChiZezuru, English, scientific and Tsime languages in classroom science communications need to be "woven together without sacrificing or dismissing the importance of their speaker's experiences and ways of knowing in the world" (Wallace, 2004, p. 908). Approaching classroom science in this way enables science education stakeholders (e.g. learners, teachers, curriculum developers, community Elders) to collaborate in the co-construction of science meanings and their interpretations. As a consequence, learners and teachers' classroom practices become double visioned (see section 2.5.4, p. 70) in that they are able to interpret the world from these two different worldviews. Thus integrative classroom science becomes a tool for assisting all learners to understand nature from multiple ways of knowing and to appreciate, value and respect not only others' cultural heritage and identity, but their own as well.

Lastly, English for western classroom science and ChiZezuru for Tsime knowledge both have the capacity to contribute to their effective integration through this third space approach. However, the variations in dialects and indigenous languages may impede the integration process of these two knowledge bodies. This is because teachers who do not share the same language background with the learners might be hampered in tapping into the layers of such learners' Tsime knowledge for teaching in their science lessons. In order for teachers to be able to do that, they need to develop skills in linguistic cultural analysis. Such skills will help them to broker the languages culturally in an indigenised classroom for the benefit of learners.

The above language dialogue reveals that language is at the heart of both the Tsime and western science cultures and knowledge systems. This comparative analysis has exposed the oriented language integrative gaps. These gaps are a result of western science content in the curriculum being presented in English. As discussed in section 7.2 above, the exclusion of ChiShona and its knowledge in the curriculum is an integrative gap by omission or co-mission. This language gap presents an extended opportunity for the teaching of the Tsime knowledge to be done in ChiZezuru. This language inclusion suggestion presents yet another layer of complexity to the teachers' tasks of teaching indigenous knowledge in their science lessons. This leads to the development of integrative classroom science in the language of indigenous learners. New Zealand offers indigenous knowledge and language of the Maoris that incorporates science education programs (Wood & Lewthwaite, 2008). These programs include the standard New Zealand curriculum taught in the Maori language and Maori

language immersion schools. These programs are guided by the Maori knowledge incorporated curriculum documents.

7.7 Pedagogical interactions

Children learn knowledge through interacting with each other and with adults (teachers or Elders). This is a feature common to classroom science and Tsime knowledge enterprises. As discussed in the foregoing section, within the classroom enterprise, learning is focused on content and process. Learning within the Tsime enterprise extends beyond content and processes of knowledge to include the paradigmatic (spiritualism) content (see section 6.2.1, p. 199) and enterprise content (see section 6.4 p. 228). Within the classroom science enterprise, the learning of science is about teachers providing frameworks that create space for their interactions with learners and the learners among themselves. This is pedagogy. The sources of these interactions are the cognitive engagement with product and process content. Pedagogy is central to learning from human interactions as much as these interactions influence pedagogy. I suggest that we understand the relationship between human interaction and pedagogy as dialectical. I use the phrase pedagogical interactions to embrace these two phenomena and their dialectical relationship. Against this background, I therefore argue that pedagogy is both an interactive and knowledge sharing (teaching and learning) tool. Thus, human interactions and frameworks (pedagogy) within which these interactions take place are integral to knowledge sharing which is learning. Arguably, the type of pedagogy adopted within the Tsime or the classroom enterprise largely influences the nature of interactions that would take place among members of an enterprise and vice versa.

Excerpt 7-12 illustrates the pupil-centred pedagogy for the teaching-learning prescribed in the syllabus.

> **Excerpt 7-12:** Participative pedagogy
>
> A **pupil-centred**, **practical approach** to the subject is advocated to encourage scientific thinking and application of acquired knowledge … Emphasis should be placed on providing pupils with **practical experience** so that they see science as an **active and exciting study**. It is recommended that a **pupil-centred, problem-solving** approach be adopted and **group or individual work** encouraged (ZJC Science syllabus, 1993, p. 4).

A pupil-centred approach is a generic pedagogical framework. There are many variant approaches and strategies that fall under this pupil-centred category. This pupil-centred

approach (or participative pedagogy, as I prefer to call it) calls for the learners' hands-on or active participation in the learning. In Meyer and Crawford's (2011) terms, participative pedagogy emphasises helping learners to learn how to "do science", that is, it focuses on the processes of science and how scientists do their work.

Three types of participative pedagogy espoused by the ZJC science syllabus can be drawn from Excerpt 7-12 above. Firstly, the practical approach expression is a recurrent theme in the syllabus and is approached in two main ways. Its direct expression as reflected in Excerpt 7-12 above as either a practical approach, with experiences or activities or it is expressed through the frequent use of the term "experiment" in notes and the activity column of the ZJC syllabus, for example, "quantities for mass and volume should be obtained by experiments" (ZJC Science syllabus, 1993, p. 6). In fact, an experimental approach dominates the entire "learning to be scientist" unit, as the syllabus encourages the experimental approaches that pervades all its units as is expressed in the statement: "The topics in this Unit (learning to be a scientist) are integrated throughout the whole syllabus" (ZJC Science syllabus, 1993, p. 5).

Experimentation is a central aspect of scientific inquiry-based teaching and learning while the concepts of inquiry teaching and learning are found in much literature. This shows that "there is still much debate on what exactly constitutes scientific inquiry in science classrooms" (Meyer & Crawford, 2011, p. 528). I will not delve into the debates on what inquiry is in literature. Of significance to this study are the authors who write about inquiry teaching and learning that borrows its tenets from the knowledge production processes of western scientific inquiry. These include "doing science", "talking science" and "the nature of scientific inquiry" (Meyer & Crawford, 2011, p. 528). According to these authors, "talking science signifies appropriating scientific discourse" and includes "learning to apply the language of science within the space of scientific ways of knowing" (Rosebery, Warren, & Conant, 1992). According to Adams (cited in Pember, 2008, p. 19), "the expression 'indigenous ways of knowing' refers to pedagogy". The term "indigenous" qualifies the paradigm rooting of the pedagogy in question. In the same light, the expression "scientific way of knowing", as used by Rosebery et al. (1992) in the above citation, refers to pedagogy grounded western scientific paradigms. Hence, it is apparent that the opening Unit A of the ZJC science syllabus, "Learning to be a scientist" focuses on western scientific paradigm grounded participatory pedagogical inquiry.

A variety of practical activities including laboratory and fieldwork activities support western

scientific based inquiry teaching and learning (see Bell, Smentana, & Binns, 2005). Bell et al. (2005) propose a four levelled framework of inquiry instruction which suggests that every practical activity or experiment is a form of inquiry that differs only in the level of complexity. This complexity increases from level 1 (confirmatory) through levels 2 and 3 (structured and guided respectively) to level 4 (open inquiry). The confirmatory inquiry embraces teacher prescribed activities in which learners are provided with all three central aspects of investigation or experimental work. These are the question (problem), the procedure, and the expected results. In doing these activities, learners confirm these aspects. In a structured inquiry, learners are requested to produce results from both the prescribed problem and procedures for experimentation. In the guided inquiry, learners design experimental procedures that lead them to generate their own findings from a teacher provided question or problem. Lastly, problems, solutions, experimental design and procedures in an open inquiry are all responsibilities given to the learners (see Rosebery et al., 1992 for a detailed framework of inquiry teaching and learning of this simplified version).

The ZJC science syllabus is not specific regarding the inquiry type of practical activities or experiments. It gives the teachers the responsibility of developing inquiry frames as they see fit for their learners' engagements with western scientific content within their classroom contexts. The syllabus methodological statements captured in Excerpt 7-13 below place responsibility and autonomy upon the teacher.

Excerpt 7-13: Impression on teachers' classroom practices' autonomy

> To give guidance, some practical activities are provided in the notes and activity column. The suggested activities and examples are in no way exhaustive and teachers are encouraged to use their own examples … The syllabus provides a fairly logical order, which the teacher or school may modify as they see fit. Unit A should however, be studied first (ZJC Science syllabus, 1993, p. 4).

Within Bell et al.'s (2005) inquiry teaching and learning framework, briefly discussed above, all experiments and practical activities start from a problem. This supports an argument that all inquiry teaching and learning are problem solving. But literature espouses the problem-solving approach as the equivalent of a higher level of inquiry teaching or learning, that is, guided or open-ended inquiry. This is because problem solving teaching strategies presuppose that learners be responsible for their own learning and can take personal actions to solve real-life problems. It is seen as a strategy that creates learner opportunities to use

classroom acquired western science in meaningful and real-life activities. This emphasises the idea that classroom science needs to be "relevant" to the learners' everyday lives and that learners need to be able to see the usefulness of the classroom science they are taught. Relevance should not only be connected to the future job markets, but also to their contemporary lives (refer to section 7.4 above). The relevancy of problem solving is highlighted in the Excerpt 7-12 as read in conjunction with objective 2.2: to "acquire scientific knowledge and skills that are relevant to the study of science and useful in everyday life" stated in Excerpt 7- 6 above.

Against the background of the foregoing discussion, I argue that teaching and learning through high levels of inquiry can only be construed as synonymous to problem solving when it takes the form of authentic inquiry. Authentic inquiry differs from general inquiry in its focus on problems to be solved from the learners' community. This is because authentic learning allows pupils to explore and engage in western scientific ideas involving real-life problems and contexts (Pember, 2008). At this level, western scientific inquiry shares the same tenets with Tsime ways of knowing. Within the Tsime enterprise, activities of knowledge sharing (pedagogical activities) are anchored to the desire to solve life health problems experienced in the community, and the community members' health management knowledge and practices are embedded in their life wheel (see section 6.5, p.231). The desire to solve the problem compels either the knowledge transferor (teacher) or recipient (learner) to disclose or seek knowledge respectively. The health problem threatens survival, hence the need to practically and orally interact to solve such life threatening problems. The indigenous inquiries of the Tsime are oral and practical (hands-on). They are lived experiences, therefore experiential. They go beyond human levels of interactions to involve spiritual and nature levels (see section 6.3, p. 218). Pedagogical interactions take place within human life activities. This finding is supported by Pember (2008, p. 19) who points out that indigenous pedagogy, that is, "indigenous ways of knowing, use stories to engage learners and emphasises the notion of community in the process". In fact, all oral forms engage learners in inquiries that are rooted in indigenous paradigms. According to Adams, in Pember (2008, p. 19), most pedagogical approaches currently being advocated in classroom sciences, such as inquiry and authentic learning, are aligned to indigenous pedagogies in "their use of a portfolio system to assess what students have learned for themselves through inquiry".

As argued in the foregoing sections, these tenets present integrative opportunities not only to include product Tsime content in the syllabus, but also indigenous pedagogical frames of

teaching. These opportunities create four possible pedagogical approaches for integrative classroom science that teachers could exploit. But before discussing these pedagogical integrative opportunities in detail, I explore the group and individual teaching strategies that the syllabus advocates in addition to the practical approach and problem solving (see Excerpt 7-12 above). The methodological statement that "[i]t is recommended that a pupil-centred, problem-solving approach be adopted **and** group or individual work encouraged" (Excerpt 7-12). The conjunction "and" in bold in this statement portrays that group and individual work can be engaged in the classroom science enterprise separate from inquiry. While this is true, it is also important to note that group and individual activities are inherent in problem solving and inquiry teaching and learning. This means that learners can engage in inquiry learning either in groups or alone.

Working in groups has been argued in literature as a strategy that nurtures both collaborative and co-cooperative learning. It creates opportunities for learners' to exchange ideas among themselves and to check their thoughts with their teacher as they engage in an inquiry task. McGregor and Tolmie (2009) outline four main forms of peer interaction that can take place during group work.

> There are different forms of social interaction during group work. It may be working 'co-operatively' (students working on individual tasks, and then sharing outcomes with other group members); 'collaboratively' (participating in joint activity, which is mutually supportive, working towards a common goal and developing shared understanding); engaging in 'peer tutoring' (where more expert students structure and support the work of less expert); or formative 'peer assessment' (where a peer critiques another's work and offers constructive modifications) (McGregor, & Tolmie, 2009, p. 30).

Pupil-to-pupil interactions (peer interactions, as I prefer to call them in this study) and other interactions overlap considerably within the classroom enterprise. Peer interactions are accompanied by teacher-pupil interactions, as within the classroom enterprise, it is the responsibility of the teacher to create an interactive environment. The small groups and an individual make up the whole class, the larger group of the classroom enterprise. Individual participation within this larger group creates self-interactions (pupil-self and teacher-self). These imply self-activities and reflections. Thus, a classroom enterprise that takes on problem solving approaches to teaching and learning creates three types of human interactions. These are peer interactions, self-interactions and pupil interactions. Self-interaction, considered as reflective and reflexive practices at individual level, are necessary for learners and teachers to

engage in meaningful interactions in group settings. To create and manage such interactions within the classroom science enterprise calls for the teacher's shifts from the "teacher-teacher" (authority) role to that of "teacher-leader" (facilitation role) (Lewthwaite, 2006). Teachers can only facilitate learning and interactions when they act as science teacher-leaders rather than science teacher-teachers only. The facilitation of the teacher aligns with the 32% of the process content of the syllabus (see section 7.5and Figure 7-2 above).

Group work is a cherished practice of the Tsime enterprise in accordance with their collectivism of totemic worldview values of community (section 4.4.4, p. 133). The Tendera community members interact within small group settings, family and peer relationships that extend to the community. Knowledge sharing is based on close relationships within small groups that spread across group interactions within the larger group. This is similar to the movement interactions created within the classroom science enterprise. The difference lies with the setting as the Tsime interaction takes place in a natural setting. Hence, interactions occur naturally and are dependent on the totem and who your relations are. The values of togetherness dictate collegial relationships among members of the enterprise. In the classroom science, the enterprise context is controlled and interactions created.

Both the similarities and differences between the Tsime collective approaches and those of western science group work problem-based approaches create pedagogical opportunities for integration. In order to exploit these opportunities, teachers need to realise that learners bring their Tendera community's Tsime knowledge, language, and values into the classroom that demands new relationships between the teacher and the learners. These tend to replace the conventional authoritative teacher role and expand the teacher facilitation role through leadership. This new relationship calls for teachers to learn from learners who might be more knowledgeable about the Tsime knowledge of their community. Both teachers and learners, as classroom science enterprise members, may realise the need to enrich their classroom practices from healers and Elders in the community. Teaching and learning roles are therefore reversed, as argued in section 7.2 above, rather than fixed roles.

Now I turn back to discussing the four possible pedagogical approaches for integrative classroom science that teachers could exploit mentioned earlier on. Firstly, integration could follow the teaching of a phenomenon from a western scientific inquiry based frame followed by that of an indigenous frame. This alludes to the within or across lesson progression from western scientific inquiry frames (pedagogy) to that of Tsime knowledge pedagogy. Western

scientific inquiry pedagogy entails teaching the content of a unit from both a western scientific interpretation and an inquiry. For example, the treatment of bilharzia I have given before. The chloroquine and clinical treatments stressed by the ZJC syllabus is a western medicine construct. Learners can engage in inquiry by exploring literature and undertaking local clinic visits. The Tsime knowledge is then the opposite of this western science frame. This Tsime knowledge pedagogical frame engages learners on how they (learners) have gained or are gaining their Tsime knowledge in their community of Tendera. This brings out their concept of bilharzia treatment through their pedagogical approaches. Extending this to Elders and healers in the community entails conscientising learners on the existence of their indigenous inquiries and the need for them to be attentive to their taken-for-granted pedagogical inquiries. Elements of diarising information from such interaction may be borrowed from the western scientific practices of recording observations.

Secondly, the teaching can be a reversal of the first approach, that is, it moves from the Tsime pedagogical frame to the western scientific inquiry pedagogical frame. This Tsime to western approach moves the learning of a phenomenon from the pupils' own cultural understanding to the western scientific cultural understanding. Such familiar to unfamiliar progression could be viewed as supporting cultural transition within the classroom context and being proactive to hazardous transitions that may emanate from cognitive dissonances. The reverse approach of foreign to familiar may challenge the pupils' learning, as initially they will be faced with the same classroom science learning "cognitive dissonances" raised in the literature of learning western science. The introduction of the Tsime knowledge pedagogical framework may come later when the children have already been negatively affected. Logically, whichever of these two integration approaches is adopted, it promotes a two-way exchange of knowledge and cultural understanding with learners retaining their indigenous identity.

Thirdly, the western pedagogical frame can be adopted to inquire about the understanding of a phenomenon from both its perspective and that of the Tsime perspective. This approach is similar to Aikenhead's (2002) approach of the cross-cultural Rekindling Traditions project. This study used western science frames to learn about indigenous knowledge. According to Aikenhead, this approach was successful in promoting the co-existence of both western science and indigenous knowledge. However, in my opinion, if teachers fail to handle this approach properly, the knowledge systems may co-exist in the curriculum but in an unbalanced manner. I argue that, though the western inquiries can move indigenous knowledge into the curriculum and make it visible, inherent in the approach is the risk of

signalling and perpetuating western science colonial superiority over indigenous knowledge.

Lastly, the fourth approach that can also be adopted follows my theoretical argument that if western scientific approaches are suitable for understanding Tsime knowledge, it should also be possible to engage indigenous (Tsime) inquiries in understanding phenomena from the western science perspective. Tsime inquiry approaches are established first and then used in the curriculum to learn about how western science understands phenomena. Arguably, this approach holds the promise of not only making Tsime visible in the curriculum but also elevating its status to that of the western science. Notably, this argument seems not to have advanced from the literature I have reviewed and may warrant further research.

Though the syllabus advocates for pupil-centred approaches, it appears that the Units that follow the introduction, "Learning to be a scientist", contribute more to the 68% product orientation of its content. This analysis shows that such topics are taught and learnt through theoretical pedagogical approaches. The following Excerpt 7-14 illustrates this.

> **Excerpt 7-14:** Theoretical pedagogical approaches
>
> Natural resources are defined as the exploitable assets a country possesses. Renewable resources can be generated whereas non-non-renewable cannot. Application to both renewable and non-renewable resources [to be taught] (ZJC Science syllabus, 1993, p. 14).

The theoretical approaches (e.g. note giving, explanations, discussions, question and answer sessions) to teaching curriculum content as inferred from the objectives, notes and activities dominate. For example, under "Unit E1: Natural Resources", the objectives are stated using the action words identify, define, describe and explain, all of which are theoretical. The syllabus emphasises scientific facts and ideas, such as principles and laws. It encourages the traditional role of a teacher as a dispenser and authority of western science in the curriculum. It aligns more with whole-class teaching and learning approaches and allows the teacher to dominate the classroom science enterprise. Their interactions are dominated more by the teacher-learner interaction type. The teacher dominates space activities at the expense of the learners' active participation because he or she is the western science "expert" in the classroom space.

7.8 In conclusion

This chapter explored possible places in the ZJC science syllabus for integrating aspects of

Tsime knowledge. It argues that the understanding of the nature of Tsime knowledge and classroom science separately is fundamental to integrative classroom science. But of greater importance is the understanding of how these two knowledge bodies dialogue with one another to uncover opportunities for integrating Tsime knowledge into the curriculum. The dialogic analysis revealed several opportunities to integrate this knowledge form into the syllabus from both the deviations and commonalities between the Tsime knowledge and western science in the curriculum. The chapter views such opportunities as signs of not only where to place the Tsime knowledge in the syllabus, but also presages tensions that are likely to arise in integrating Tsime knowledge into it. Such indications inform decisions on what proactive measures to take to ease such tensions. What matters and makes the difference is that this chapter has shown that the ZJC science syllabus itself is permeable to integration with the Tsime knowledge. The opportunities also present suggestions on the content to use and how to use it. Furthermore, the chapter suggests a holistic and parallel approach to integration that caters for all facets of classroom science and Tsime knowledge. But this evokes the question: What do the voices of the participants about integration suggest? This moves the discussion of findings to the next Chapter Eight that I title “Towards integration” in order to fully answer my second research question: How can indigenous knowledge of plant healing be taught in science classrooms?

8 CHAPTER EIGHT: TOWARDS INTEGRATION

8.0 Introduction

This chapter addresses the second and final research question of this study: How can indigenous knowledge of plant healing (Tsime knowledge) be taught in science classrooms? The chapter answers this question in accordance with the four aspects of teaching described in Chapter One of this study. These are place, content, pedagogy and pathway (section 1.3, p. 10). Findings related to these taught aspects give answers to their corresponding sub questions that are as follows:

- Place: Where in the ZJC science syllabus could some aspects of Tsime knowledge be taught?
- Content: What aspects of this knowledge could be taught?
- Pedagogy: How can they be taught?
- Pathway: How can they be moved into the syllabus?

The chapter synthesises the voices of the participants on integration with findings from Chapters Six and Seven to answer these questions. It does this through a thematic discussion of main themes that emerged from the data collected. These are: (1) A complex view of integrative classroom science; (2) co-existence integration; and (3) a synthesis of Tsime knowledge for classroom science. This is done after a clarification of the concept of "participant integration voice" as used in this thesis. Then an illustration of how integration could be done follows. To conclude the chapter, challenges and implications of these findings for integrative classroom science policies in Zimbabwe are highlighted.

8.1 Participant integration voice

In the context of this chapter, the participant integration voice is the combination of notions that participants hold about integrating their Tsime knowledge into westernised classroom science and how this could be done. Awareness of what participants think about integrative classroom science requires sensitivity and effort to listen to the people intimately affected by this reform. Because some aspects of Tsime knowledge are secretive and sacred, it became necessary to establish the aspects of this knowledge that participants were comfortable with their teaching in classrooms. Listening to them (participants) is then most likely to lead to the meaningful, legitimate and respectful teaching of the participants' knowledge within the schooling context. Furthermore, it is important to ask for their consent to collaborate with

teachers or researchers in finding solutions for integration. In fact, the participants' voices generated themes informative to integration that I now report on in the following sections.

8.2 Complex view of integrative classroom science

Participants had varied views about the idea of integrating their Tsime knowledge into classroom science. But, overall, they conceded that integrative classroom science was a worthwhile undertaking albeit demanding. Their voices generated the "yes", to integration, "no" to integration, and "yes-but" to integration categories. The following sections will discuss each of these themes. The content, pedagogy, and pathway including any other aspects of teaching are also discussed within the context from which they emerged.

8.2.1 "Yes" to integration

Some participating Elders, healers and learners expressed full support for integrative classroom science. Some spirits in trance of their mediums were also in complete support of the integrative classroom science. To some of the Elder participants, integrative classroom sciences created room for decolonising themselves (the black people who formed the participants of this study) and their knowledge systems from the aftermath of colonial oppression. Further, it would make the science education relevant to them as indigenous people. For example, Elder Munda is captured in the following Excerpt 8-1.

> **Excerpt 8-1**: Our children need to learn our culture also
>
> Our children should also learn about '*kuchengetedza utano pachiVanhu chedu'* (our cultural ways of managing health). Healing with plants is not new to our community. It is part of us … we have lived with it ever since. Among us here are healers (he pointed to three of them vaRise, vaMapiri, vaPonga). We know this, our children know it.… we agree our healing knowledge is not in schools … this is not surprising; it was also not taught during our schooling time … that was colonialism … we are in indigenisation era ... got land … same with schools. Things are changing, they ought to change … taking our things back. School children must also learn our culture … The government slogan is here (pointing to the print on the ZANU PF T-shirt he was wearing) (Appendix A-01, March 30, 2014, CT).

This Excerpt 8-1 reveals a number of issues relevant to integrative classroom science with which some Elders concurred. The prints on Elder Munda's T-shirt read "Indigenise, Empower, Develop, [and] Employ". An interpretation of these prints in conjunction with his

sentiment that their Tsime knowledge was not taught in school during the time of colonialism suggests a de-colonisation purpose of integrative classroom science. This decolonising of the school science agenda has been advocated for over a decade and is still being advocated by a number of indigenous scholars (see Battiste, 2002; Battiste, & Henderson, 2000; Dei, 2002; Smith, 1999). Though the Elders might not realise it themselves, the sentiment that "school children must also learn about our culture" in Excerpt 8.1, above, brings to the fore the need to align what children learn in classrooms with what they bring from their communities. This presents another purpose for integrative classroom science, which is to make the science education relevant to the indigenous children of the community of Tendera.

The Great Spirits also endorsed this de-colonisation agenda for integrative classroom science. For example, the Great Spirit Dube, in our (myself, the link teacher and his assistance) meeting commented as shown in Excerpt 8-2 below.

> **Excerpt 8-2**: Reclaiming cultural identity within the dominating system
>
> *Takatsikirirwa kwenguva* (We have been suppressed for too long) … *Vasina kusimba vakatadza kudzoka kuzobatsira vana*. (Some spirits have been weakened and have failed to come to this physical world to assist our protégé. (He snuffs and roars. We clap hands and chant in praise) … It has been an on-going war … *rinoita shoko iri rematare ano* (the request given in this meeting is fine) … *munhu hashambi ari kunze kwemvura* (you do not swim out of water)... *warinzwa musikana* (do you understand this girl referring to me. I said I needed clarification. He called Elder Mazi one of the members of his assisting people to explain) … I am now going (addressing the mediating wife *ambuya* Duve), tell him (sekuru Miti) what I have said (he roared like a lion and left the hut) (Appendix A-01, March 21, 2014, CT).

The saying "we have been suppressed for too long" implies the subjugation of spirits and their roles in the community that was brought about by colonialism. In saying this, *tateguru* Dube brings claims that spiritual and invisible decolonisation fights for cultural knowledge recognition have been on-going. He expresses that "you cannot swim outside water" to reveal the power dimension of western science over cultural knowledge in the indigenous communities within the larger modernised global context. As such, he is advising his medium (*sekuru* Dube) and his team, and others, that they cannot elevate the long suppressed Tsime knowledge to the equipollent position of western science outside the school system. To him, a decolonising journey of such cultural identities has been ongoing in an effort to restore and balance Tsime knowledge through the powerful western schooling. The swimmer is less

powerful than the water, but will he or she be afloat above it if he or she learns to swim in it? Thus, *tateguru* Dube seems to be expressing integration as a clear strategy for preserving and protecting indigenous knowledge of medicines in the future generations.

In excerpt 8-3 below, *tateguru* Mukono also saw the decolonising of Tsime knowledge as a good cause for integrative classroom science. To him, this project was an indication that his protégés were now being awakened from the comfort of their modernity[20].

Excerpt 8-3: Awakening from sleep

> You are now waking up … we lived through the guidance of our ancestors and living parents during our time… this is different … as it stands, you are chameleons … living English life … coming to us when things become tough … But we are always looking after you … you at times forget to do what should be done for us.… You live their (whites) way ... this is what you have to do … *upenyu ibindu pindu* (life changes) (Appendix A-01, October, 31, 2013, CT).

The metaphoric description of us as "chameleons" blames our lifestyles and thoughts that alternate between western and indigenous ways, as we see fit. This bears a resemblance to the way that chameleons change their colours. Apparently, this observation is substantiated in the literature as far as health knowledge and consumption of services are concerned. It states that many Zimbabweans are triple consumers of health services rooted in western medicine, African medicine and Christianity (see Chavunduka, 2001; Kazembe, 2007; Mpofu, Mushayikwa, et al., 2014a; Shizha & Charema, 2011). Furthermore, the contiguity argumentation theory states that most Africans hold dual worldviews, indigenous and western science, in a state of one dominating the other depending on the context in which they find themselves. However, a positive point about this chameleon knowledge is its complementary approach to health services that aligns with a parallel integration approach (section 2.2.1, p. 29 for more detail about this pathway). The integration strategies emerging from the voices of participants will be covered in more detail in section 8.3 below.

The Elders also viewed the teaching of Tsime knowledge in classrooms as necessary for restoring *Unhu* in their children. *Unhu* is an African philosophy that anchors and shapes people's language, thinking, behaviour and relationships within African communities (see section 2.3.3, p. 36 Chapter Two for more detail). The *Unhu* moral values that the Elders

[20] The current era related to modern life (see footenote 6, p.85) which is associated with lifestyles influenced by western cultures.

expected to mould their children's behaviour can be identified and drawn from in their axiological frame depicted in Figure 4-3 of the totemic worldview that is documented in section 4.3 (p.137). During the last session with Gomo school leadership committee, village head Gomo expressed the Elders' view of this *Unhu* rebuilding purpose of integrative classroom science as excerpted in 8-4 below.

Excerpt 8-4: Re-build *Unhu* in our children

(He starts by observing a cultural protocol) *Mainini,* (the Zezeru way of addressing me, the researcher, because he shares the same *Shava* (Eland) totem with my husband, and yet he is older than my husband) you were brought here by our ancestors. *Kutimutsa kuhope kuti tofa nenzara takagara pfimbi yamazhanje* (to awaken us from sleep in which we are dying of hunger when we are sitting on the ground that has fruits hidden under it) … we know but we do know … *ChiVanhu chedu ngatichiite pachena sezvatinoita kuPositori nekuchipatara.* (We have learnt that we seek healing and practice from our own people and culture in the same open manner we do with Christianity and Hospitals). Even our Great Spirit Mukono is happy I visited him last week. He (referring to the Great Spirit) said many of them (spirits) are on their way to this land to re-store order … *Isu tanga tichichiti chibwe chiremerera chiri kure* (we were openly showing our respect to Christian and Hospital healing at the expense of our own) … *Nenzira yatafamba tese ndizvo zvinoda nguva yatiri kurarama iyi* (The path we have taken with you has shown us how to survive in this modern world). Even the parents of the children you are working with are happy…. It would be great if other children would learn what we have and their counterparts have also learnt … Us (he looked up pensively) … we re-build *Unhu neChivanhu* of our children together (referring to the community and the school). *Handizvo here* (is that not so) *Mufakose*? (He said this addressing the link teacher. The link teacher, Mr Rusa, agreed with village head Gomo. Mufakose is a variety of the Eland totem) (Appendix A-01, February 20, 2014, CT).

Excerpt 8-4 raised many other important integration issues in addition to viewing of integrative classroom science as creating opportunities for re-building *Unhu* in their children within the contexts of schooling. The testimony that Elders have learnt to openly practice healing with plants in the same manner we do with Christianity and hospital services shows that this knowledge body was not only held secretively, but was also hidden behind Christianity and western medicine. Another objective of integrating Tsime knowledge into classroom science then emerges that openly values and practices this form of knowledge. It further reinforces challenges of access to this knowledge body noted and discussed in

Chapter Six. These access challenges are discussed in more detail in section 8.2.2.1 below. The statement that "we re-build *Unhu neChivanhu* of our children together" also suggests the need for schools to collaborate with community Elders for the integration of Tsime knowledge to be successful. The term "we" refers to members of the leadership committee that was representative of the community Elders, the School teachers and the research academy. That collaborations are important vehicles to alleviate challenges of accessing Tsime knowledge from its holders emerges here. Collaborations, as a significant strategy for successfully integrating Tsime knowledge into the classroom science, will be discussed in section 8.2.3.2.

The view that the products of western science (televisions, radios, cell phones) were eroding *Unhu* in the community of Tendera was prominent among the Elder and healer participants. In expressing this, Chief Tendera showed a concerned face as he lifted up his cell phone[21] and, in a wistful voice, said:

> **Excerpt 8-5**: Western science is degrading *Unhu* in children
>
> This is what you call science (referring to the cell phone). This (the cell phone) and televisions are destroying our children's *Unhu*. They are quickly turning into prostitutes. Young men no longer know health problems; they can assist women with (he laughs sarcastically and snuffs, rubs the remaining snuff on his head above the forehead and clicks in displeasure) … liars, a-a *chisionekwe* (that which has never been seen, abomination) they treat our women and daughters of *sare* (a genital woman disease that they believe causes women infertility and should only be treated by fellow women)…. That is your (points to me) science. I don't want it. It starts with you, teaching our children *ChiVanhu*. I don't want it (science) in my schools. *Ndiyo yaunza zvose zvakaipa munyika ino, shuramatongo chifambi zvose nekudzingira mvura kumatenga* (It is the one that has brought all diseases like HIV-AIDS, prostitution and dry spells in this country (he clicks again). *Handichatoidi, ngaibve muzvikoro zvangu* (I do not like it, it must be removed from my schools) (Appendix A-01, March 30, 2014, CT).

In Excerpt 8-5, Chief Tendera is accusing the scientific enterprise for causing moral degradation through its products (e.g. cell phones and televisons) which is the basis of his argument for the removal of school science altogether, replacing it with the teaching of *Unhu*. As discussed in section 2.3.3, the *Unhu* African philosophy is at the centre of its culture and

[21] Every community Elder, including healers, was in possession of a cell phone which I, at times, used to communicate with them.

therefore is inseparable from indigenous knowledge (p. 36). Thus the suggestion to teach *Unhu* connotes the teaching of Tsime knowledge and the culture of Tendera. The Chief's view, of replacing the teaching of western science in schools with that of Tsime knowledge, conforms to the principles of substitutive integration. The quadruple model of integration describes "substitutive integration" as the displacement and replacement of one knowledge body by the other (Mpofu, Otulaja, & Mushayikwa, 2014). Details of the quadruple pathways of integration are discussed in the literature review, section 2.2.1 (p.29).

Other healers and Elders concurred that the products of science have undermined the *Unhu* values in the Tendera society, but were of the view that the teaching of *ChiVanhu* (Africanness) in the classroom needed to be done alongside that of western science. Excerpt 8-6 that follows expresses what Elder Mapiri said in relation to this issue.

> **Excerpt 8-6**: Teach culture in addition to science
>
> We communicate with my sister, *VaMamoyo* (referring to me because our mothers share the same Hungwe totem) with the phone, even when she was in South Africa, *kunaka kwadzo* (this is good about western science) … we came here easily, by your car instead of walking the whole day … It is the way our children are using televisions and phones which is bad. Their interest is in *zvakaipa*, *ungochani*, *zvepabonde zvichingodaro* (sexually related aspects) that is very wrong … our culture should be strengthened in schools so that it deters children from using science wrongly. *ChiVanhu chedu chaparara; chikadzidziswa muzvikoro chinosimba zvakare* (Our culture has disintegrated. If only schools could teach it, it can be salvaged (Appendix A-01, February 28, 2014, CT).

These views emphasise that the exclusion of *Unhu* teaching in schools has weakened the community of Tendera's cultural fabric. The expression "our culture should be strengthened in schools" reveals that these Elders are aware of cultural exchanges between western science and indigenous knowledge. They see the teaching of African *Unhu* as necessary for giving guidance to their children on choosing between right and wrong in this modern world. Notably, such Elders appreciated the benefits of western science. As a result, they are suggesting the teaching of Tsime knowledge in addition to western science already being taught to their children. Integrating Tsime knowledge into classroom science ameliorates indigenous cultures in science and prevents them (cultures) from any further alienation. According to the quadruple model, this movement can be achieved through either the parallel model of integration, or the convergent model, or both. Parallel integration alludes to the

side-by-side existence of western science and Tsime knowledge in the syllabus and convergent integration relates to the synthesised knowledge of the two (Mpofu, Otulaja, & Mushayikwa, 2014).

The Elders' concern about the fast depleting *Unhu* amongst their children, and therefore the need to introduce its teaching in the schools, is in agreement with some components of the curriculum framework shown in Table 8-1 below.

Table 8-1: *Unhu* in the curriculum

Document	**Section/s and contents**
Cultural policy 2004	2.1.1 (i) Family and community socialisation process should strengthen our traditional values through the utilisation of discipline, positive values, strong ethics, morals and collectivism constituting *Unhu/ Ubuntu* (p. 15). 2.1.1 (ii) Our traditional performing and visual arts should be handed down from generation to generation through socialisation in the home, community and traditional education syllabi in schools, colleges and universities.
Curriculum Secretary's Policy 2/2002	2.1 Producing citizens who understand, appreciate and accept their civic and moral responsibilities within society; 2.2 Promoting national identity, pride, unity, cultural norms and values so as to preserve the Zimbabwean heritage through the teaching and learning of the appropriate humanity, and indigenous languages;
Nziramasanga Report 1999	Establishment of the new philosophy of Education – *Hunhu/Ubuntu* and restoration of children's African behaviour of *Unhu* (p. 19- 23)

Table 8-1 shows that the government of Zimbabwe is for the framing of its education system within this philosophy of *Unhu.*

Sixteen (16) learners indicated that they wanted to learn about Tsime knowledge in schools. Table 8-2 summarises the learners' reasons for supporting the integration of their Tsime knowledge into classroom science. These reasons were drawn from the pupil's individual writings and follow-up class discussions (see Appendix F-01). The count column represents the number of learners among the sixteen who supported integration based on the respective

reason. The counts are not mutually exclusive, that is, an individual learner brought forward as many of his or her reasons as possible.

Table 8-2: Learners' reasons for supporting the integrative classroom science

Reasons	Count
a) Use of western medicine challenged ailments, e.g. *Mhuka* (cancer)	16
b) Identify bogus and real healers and Elders	16
c) Ask about things	13
d) Get access to local healing plants	13
e) Add to knowledge in order to manage a variety of ailments	12
f) Share the hidden and sacred knowledge	5
g) For popularity through future complemented practices	3
h) Freer to talk about traditional healing	3

These reasons for integrative classroom science given in Table 8-2 above collectively inform on aspects of Tsime knowledge the learners consider as relevant for classroom science. To the majority of participating learners in this "yes" category, integration that brings Tsime knowledge into classroom science builds onto their prior knowledge (reason 8-2e) and the fact that they would apply it to their lives in the community (reason 8-2a), makes school science relevant. To some learners, the sharing of hidden and sacred knowledge (reason 8-2f), access to more knowledge of local plants for healing (reason 8-2d), and identifying bogus and real healer practitioners (reason 8-2b), all allow classroom science to build on learners' previously held Tsime knowledge. The learners indicated that they valued classroom science that is connected to their everyday community lives. Such purposes of learning blends into their lives the survival function of the knowledge of healing with plants, which recurrently emerged in several sections of Chapter Six, for example, the knowledge of plants for healing (section 6.2, p. 198- 218) and knowledge imbedded in plant healing uses across the human wheel of life (section 6.6, p.236). It also tallies with the purposes of learning identified in section 7.4 of Chapter Seven (p.249).

Some learners also supported integrative classroom science because their Tsime knowledge was effective in managing ailments, such as cancers, epilepsy and HIV-AIDS that are challenging western medicine (see reason 8.2a). Their recognition that western medicine has not yet found solutions to some ailments that are treated with their Tsime knowledge, tallies

with the syllabus objective that desires learners to understand some limitations of western science (purpose statement 2-6, Excerpt 7-6, p. 254). This observation was held by all the participants. These participants' sentiments are illustrated by what *sekuru* Nzou said in Excerpt 6-15 (p. 228). They are suggesting that it is important to find synergy between indigenous and western medicine in the treatment of these ailments. According to *ambuya* Suma, this is what managing disease is (Excerpt 6-3, p.194). Notably, the efficacy of healing plants is recognised in Zimbabwe at both legislature and health policy levels (see sections 3.4, p.91), as well as within the literature (see Chavunduka, 2001; Kazembe, 2007; Maroyi, 2011, 2013). But these instruments do not specify the type of efficacy they support.

Thoughts held by some learners that the "ask about things" (reason 8.2c) and "freer to talk about traditional healing" (reason 8.2h) needs for integrative classroom science reveal the thoughts of classrooms as vested with the freedom to "talk and ask" relative to their community world. This makes sense in light of their "you cannot ask about this" recurrent responses to some aspects of indigenous knowledge of plant healing. Even Elders and healers would say, "this is what it is and it has been like this since antique times". These pedagogical reasons point towards the learners' appreciation of western scientific inquiry learning as needed for opening up discussions of some cultural aspects. Such issues are otherwise closed in their community and are embedded in the secret level of Tsime knowledge (see section 6.4.2, p. 229). They view such pedagogical approaches as supporting the sharing of this knowledge and facilitating their access into its hidden aspects. This thinking agrees with the western pedagogical frame of teaching about indigenous knowledge indicated in section 7.7 (.p.276). It also resonates well with the argument for authentic inquiry in science classrooms that seeks to align the nature of science with multicultural views of science proposed by Meyer and Crawford (2011). However, it can be problematic to discuss the secret freely, sacred and mysterious tenets of Tsime knowledge. Even literature (see Keane, 2008) acknowledges that several aspects of indigenous knowledge are secretively guarded. In fact, the western scientific inquiry tenets of questionings or probing and free talk may conflict with some culturally accepted norms of Elders (Lee, 2003). These tensions can be resolved by respecting areas of secrecy and sacredness. Like patents, they hold secrecy that we do not probe into, but understand why they are upheld.

Though rarely, some learners also supported integrative classroom science learning because they viewed the primary goal of classroom science as preparing them for future complementary medicine practice. Such practices combine western and indigenous

approaches to medicine. The following Excerpt 8-7 illustrates this view of classroom science held by some participants. Emure of Gomo School said:

Excerpt 8-7: Future complementary practice

> I want to learn everything about *kurapa kwechiBhoyi* (healing with plants from an African perspective) … I mean everything healing plants, spirits, mermaids (laughs from her peers) … E-e-e this is what I want, let me tell you (she raises her voice) … I want to be a medical doctor. They do not teach about traditional healing. Is that not so, madam? (The question was directed to me and I told her to say what she thought to avoid influencing her thinking) … Ya-a, that is what I think. So even if I am not taught in my training to be a doctor, I will have knowledge. People want good doctors. I will be good using modern medicine and *Chibhoyi* … I will make money (Appendix F-01, October 10, 2013, CD).

The learning purpose for future complementary practices envisions classroom science as being relevant in the future of the children as adults. This classroom science goal, to synchronise the background knowledge of the learners life, fits into the continuity and accommodation perspective of classroom science as described in section 7.4 (p. 253). Such thinking might have been influenced by the story of Dr Mishonga (*name of practice known to community members only*), which was brought to my attention by Elder Zuru of Deve School in one of our leadership committee sessions as described in Excerpt 8-8 below.

Excerpt 8-8: Motivating story

> Ok, in this locality, a young man once helped a lot of people with heart problems … He was told this healing plant by his grandmother. By the way he passed away some two years ago (another member of the committee asked "are you referring to that young man?" Yes, Leo Mishonga. He thought of an idea to live better with his grandmother's knowledge. He approached Dr Stamps (Minister of Health in the 90s). He was given a chance and allowed to practice. He had an office in Harare … We saw him coming here to collect the medicine in sacks … He died with the knowledge because he refused to disclose the identity of his plant to the Doctors … They called him Dr Mishonga without training (referring to western medicine educational training) (Appendix A-01, May, 10, 2013, CT).

The thought that western medicine in Zimbabwe is taught as western science is held by such learners and Elder Zuru is notably correct as shown in the health section 3.4 (p.91). Such thoughts envision integrative classroom science to equip learners with the knowledge of

indigenous medicine as an alternative to that of western medicine being taught. This thinking is based on their observations that most people of Tendera rely on both forms of medicine for their health needs. To support this observation are the revelations by both *sekuru* Miti and *ambuya* Suma that are confirmed by the clinic staff who said that local clinics referred some of the patients to them (plant healers). Literature (e.g. Chavunduka, 2001; Shizha & Charema, 2011; Xue, 2008) also reveals complementary consumptions of indigenous and western medicine services in Africa and the world at large.

It is clear from the above discussion that the learners' survival and future complementary medical practices reasons for supporting integrative science differ remarkably from the decolonising and *Unhu* reasons advanced by the Elders. These differences could be interpreted in many ways. In one way, this could be revealing that learners, as "born frees"[22] are not concerned about issues of decolonising, but rather are appreciating the technology of cell phones, radios, cars and televisions that western science has brought to them through colonialism. Even some Elders appreciated their improved life styles resulting from these products of western science (see Excerpt 8-6). Thus, it is quite probable that learners do not know what it means to be colonised. Actually, they all expressed appreciation for western science and medicine that they are taught in schools because they said it was laying a foundation for their career prospects in western scientific fields. This goal tallies with the purpose of teaching ZJC science discussed in section 7.4 (p. 249). Emure, in Excerpt 8-7 above, revealed career aspirations to become a western medical doctor. So, to the learners, the decolonising agenda might be of little or no relevance. This issue of relevance evokes the question: what is relevant and to whom? (Stears, 2010). The issue of relevance, therefore, is also problematic in integrative classroom science. It points towards the need, not only to understand the purposes of learning Tsime knowledge in the context of schooling from both the learners and Elders' views, but also to reconcile them prior to classroom practice. One can argue that the process of reconciliation can instil in learners the understanding of the decolonising and *Unhu* purposes of integrative science envisioned by the Elders. Elders could also understand their children more and the knowledge gaps that needed to be filled in them (children) through science education.

Three individual healers of the seven healer participants also fully supported integrative

[22] The label 'born free' is popularly used in political circles in Zimbabwe in reference to all children born after independence particularly when they raise issues contra to the government decisions.

classroom science based on their views that both knowledge systems were of value for managing human health. *Ambuya* Suma's reiterations as captured in Excerpt 8-9 below illustrates data from which this finding emerged.

Excerpt 8-9: Both knowledges have strength

> No knowledge is better than other … it has not been in order that schools teach one science … The African approaches have their own strength … the English have theirs…. If only I was as educated as you are I would be living well now … would be stronger and better … in this modern society. So our children need both knowledges … as long as they want to learn like what you did … there is need of doing it the right way … my uncle who initiated me into this practice … wishes people to live a healthy life … those who want to know should be taught (Appendix A-01, March 26, 2014, CT).

The need to recognise both knowledge systems in the classrooms and in real life emphasised in Excerpt 8-9 above, aligns with the yearning of many indigenous scholars (e.g. Aikenhead, 2001, 2002; Barnhardt & Kawagley, 2005; Battiste & Henderson, 2000) for integration of indigenous and western knowledge forms in the classroom. This envisioned purpose of integrative classroom science has been metaphorically expressed by Hatcher et al. (2009) as "two-eyed seeing" and

> recognizes that in a particular set of circumstances we may choose to call upon the strengths of indigenous sciences, and in another set of circumstances we may choose to call upon those of western sciences (Hatcher et al., 2009, p. 9).

Discussing the nature of science and how to teach it, Savage and Fiador (2004, p. 18) quotes Amegavi suggesting that "… it is wise to take the best from science and our (African) culture … we must also make sure we reject the worst from both". These desired integration goals could be best achieved through a side-by-side representation and visibility of both knowledge systems in classroom science that we describe in Mpofu, Otulaja and Mushayikwa. (2014) as "parallel integration". The assertion that "as long as they want to learn" (Excerpt 8-7, p.290) reinforces integrating Tsime knowledge learners deem relevant to learn in classroom settings as discussed in the foregoing paragraph.

Though in support of integrative classroom science as well, *sekuru* Kari and *sekuru* Nzou felt that spiritual elements of knowledge for plant uses for healing could not be taught in the school set-up. To this *sekuru* Nzou said:

Excerpt 8-10: An appropriate mix of knowledge for modern world

> Our culture has many *masaramusi* (mystical, tricks and myths). In this modern life *zvemhepo zvave zvishoma* (assisted healing whose source of knowledge and practice is a spirit)…. the truth is (his truth) this is now 'old fashioned' (referring to assisted healing). Some of our children are not even aware of this (spiritual) aspect. The teaching of these tricky aspects might cause division among community members … some are Christians, others Moslems, others traditional. So please let's concentrate on 'real' healing plants (Appendix A-01, March, 2, 2014, CT).

The importance of selecting appropriate aspects of Tsime knowledge to integrate with western science is being underscored. Given the diversities of this knowledge body revealed in Chapter Six, this issue of appropriate aspects for classrooms science is problematic. According to *sekuru* Nzou, "real" Tsime knowledge needs to be integrated into classroom science to avoid conflicts with other religious worldviews. To him, as a herbalist, and other participants who shared similar thoughts, real knowledge is the product or physical knowledge that bears natural efficacy. From his utterances that assisted healing services are "old fashioned" and his herbalism practices, one could argue that *sekuru* Nzou is not a true custodian of Tsime knowledge. The term "old fashioned" aligns well with the colonial mentality of primitiveness and backwardness that many indigenous people are aiming to decolonise. All this makes the subject of integrative classroom science very complex because the issue of appropriate knowledge evokes several questions whose answers are difficult to discern. For example, what is appropriate, to whom, at which level and for what purpose?

The findings discussed above are showing that there are two schools of thoughts about what parts of Tsime knowledge to include in classroom practice. The majority of these "yes" participants to integration suggest the inclusion of all aspects of Tsime knowledge. A few of these participants suggest the inclusion of the physical substances of natural efficacy. As they justified integrative classroom science, these participants revealed aspects of their Tsime knowledge that could be included into the classroom science. These include: the purposes (goals and objectives) of integrative classroom science, the Tsime content for classroom science, the integrative pathway for moving Tsime content from the community into classroom science and the pedagogy for teaching these aspects. For example, some Tsime content suggested for classroom science include culture and *Unhu*, *Sex* (*zvapabonde)*, sexuality and homosexuality (*ungochani*). The inclusion of *Unhu* teaching also connotes the pedagogy of working together (collaborations) in the classrooms as well as classroom

management aspects such as discipline. The metaphoric language such as *zvepabonde* and "like a chameleon" similes suggest the teaching of language content as science. Some of these classroom science aspects suggestions tally with the ones unravelled in Chapter Six and Chapter Seven (see Table 6-4, p. 238, and Table 7-3, p.263). Others add to the list of suggestions. However, all these suggestions indicate broad topics of Tsime to be taught. This is when we fall back to the Tsime knowledge resources documented in Chapter Six for concept details under each topic (see Table 6-4 for illustrations). This is the subject of section 8-4 to come. Collectively, these findings expressed the idea that integrating Tsime knowledge into classroom is a complex endeavour that calls for thorough preparatory groundwork before classroom practices. These preparations are only made possible by holistically detailing information about all aspects of integration drawn from its three main sources of information. These are knowledge in the community, western science in the curriculum documents and the participants' voices.

Having looked at those of my participants who believe in integrating indigenous knowledge into classroom science, I now move on to another group offering something slightly different.

8.2.2 "Yes – but" to integration

Participants in this category, which included the two core teachers, two individual healers and some Elders, expressed their support for integration but with uncertainty about its feasibility. The two sub-themes, integrative classroom science challenges and alleviating integration challenges, form this main finding discussed in this section.

8.2.2.1 Integrative classroom science challenges

Participants in this category believed that moving the Tsime knowledge into the classroom space faced many challenges that needed deep thinking and thorough groundwork before it could be done. Reconciliation of diverse backgrounds and access to indigenous knowledge of plant healing from its holders were identified as the main threats to the successful implementation of this reform. For example, during our (Deve leadership committee and myself) first session. Elder Zuru a retired teacher is captured in the following Excerpt 8-11.

Excerpt 8-11: Difficult and suspect notion

> *Ndizvo hazvo* (he became pensive and there was dead silence). *Hapeno kuti ambuya muchapabatatinadza sei*. (He resumes talk and code switched as he spoke which I am presenting as is). *Ma*beliefs *anosiyana*. *Mumwe ane ma*beliefs *ema*spirits, *mumwewo* Christianity, *mumwewo zvese*. *Mumweyo haana kwake kungorarama fanika vafana vemazuva ano*. The difference in beliefs is that we are born in different families and by different mothers. Brought up differently, grow up differently, travelled to different places and countries, and worked in different companies. *Mapaonaka pakaoma. Modii nazvo* … (Mr Madza the head of the school tried to interject but VaJeme insisted on talking). *Mira iwe*. *Chimweno, iyi* area *yamabata iri* sensitive, *vanhu vanogona kumira kuti* why release this information. *Imo muno tose tine madzinde edu.* But why *zvanyonyi dii? Saka musina* information *nokuti varidzi varamba nayo modii*. *Hapana chokudzidzisa muzvikoro*. Thus the end of it. *Mazvionaka ambuya* (Appendix A-01, May 10, 2013, CT).

The Tendera people's background diversities raised by Elder Zuru in the above Excerpt 8-11 was also noted by other participants in this category. In raising this challenge, Elder Zuru remarked "*muchapabatatinadza sei*" before saying there were variations in beliefs across families in the community of Tendera. He ended up by saying "*Mapaonaka pakaoma. Modii nazvo*". The message here is that the integration endeavour is complex because of variations in people's beliefs that emanate from different religious affiliations and exposures to other cultures from travel, work places and educational levels. To such participants, reconciliation of these diversities in the classroom was a colossal task. Reconciling diversities in pursuance of integrative classroom science goals has also been raised by other indigenous scholars in science education. For example, Otulaja et al. (2011) question the wisdom of asking teachers to integrate indigenous knowledge into their classrooms before looking into their varied belief patterns. On commencing my fieldwork, I also got the impression that the people in Tendera were diverse in their religions (see section 3.3, p. 89). The literature has also documented that individual people or families sharing the same cultural backgrounds also held beliefs or worldviews unique to themselves (Kearney, 1984). This does not mean to say such people discarded their community beliefs or worldviews, but rather their unique beliefs co-exist with those they share with other people of the same cultural backgrounds. In fact, from the findings in Chapter Six and in Mpofu et al. (2014a), one could argue that such diversities could be cursory as the participants' inner beliefs and practices are similarly traditional. All that is needed is to penetrate into their inner and secretively guarded layers of this knowledge. Of course, this calls for culturally appropriate access strategies (Aikenhead,

2002) which I demonstrated in Chapter Five.

In Excerpt 8-12 below, Ms Zivo cautions on the consequences of introducing Tsime knowledge into classroom science prior to addressing religious belief challenges to integrative classroom science.

> **Excerpt 8-12:** Several challenges need to be addressed before classroom practice
>
> Well it sounds a good idea (silence) … Um-m, I do not know how to say it in Shona (I encouraged her to use English or to code switch) ... This is difficult, Mrs Mpofu. Ok, let me say, it requires us to teach … when we have gathered authentic knowledge … how it really functions … because if we fail to do this we might teach our children the wrong things … some assisted healers are bogus … the authentic healers do not want to be known … most of them are not ZINATHA registered (she seems to be in deep thought) ... do not want to release their knowledge … keep this knowledge in their hearts to graves … not easy for us to persuade them to give us this knowledge … How are we going to convince them?... Have you noted that Chiweshe is an area of apostolicism? (I nodded). E-ee, it makes teaching indigenous healing to the children of apostles very difficult. They are so against tradition … clash with their religious belief**s** … strong that they can even drop out from school … Enrolments will go down … we cannot do it … will we not train every child to be a healer. Are we moving towards modernising our traditional way of life? What then will be the roles and responsibility of our community healers? Is this not against our traditional beliefs? In our culture we say '*kuburitsa dzinde kuriparadzira kuvazhinji … kurifumura handiti*' (by teaching this knowledge we're publicising it … this is against our cultural belief that this will erode its medicinal efficacy, is that not so). What are we hoping to achieve by doing this? As a science teacher, I think we need to establish scientifically whether the efficacy of these healing plants we will teach is better than that of modern medicine. For example, what is more effective to treat sore throat with antibiotics or barks? If antibiotics are better, let us not waste time with teaching about barks (Appendix A-01, December 26, 2014, CT).

The above excerpt explains that failure to handle religious diversities could result in parents and children living in Christian and other religious faiths while condemning integrative classroom science as irrelevant. As Ms Zivo has pointed out, this leads to dropping out of school of those children with religious backgrounds that are opposed to African traditions. It would then lead to low school enrolments thus defeating the education for all constitutional undertaking by The Government of Zimbabwe. This is because the knowledge and practices of plant uses for healing is inseparable from traditional religious practices (Chavunduka,

2001; Mbiti, 1990). Bringing out this religious challenge to integrative classroom science, she said,

> Have you noted that Chiweshe is an area of apostolicism … it makes teaching indigenous healing to the children of apostles very difficult. They are so against tradition…clash with their religious beliefs…strong that they can even drop out of school…Enrolments will go down (Excerpt 8-12).

This challenge coincides with Aikenhead's (2002) observation that some parents living in a fundamentalist Christian faith may be uncomfortable with their children being taught spiritual aspects of indigenous knowledge.

Another challenge on how to access Tsime knowledge from its holders permeated the views of participants in this category. Participants, such as Elder Zuru (see Excerpt 8-11) and Ms Zivo (see Excerpt 8-12) pointed out that interrelated factors caused the difficulty in accessing this knowledge from its human holders. These participants cited the authenticity of both this knowledge and its human sources as one of the major contributing factors to this knowledge access challenge. They said that not all of this knowledge was authentic as its authenticity depended on the genuineness of the human source. Ms Zivo brought this out when she said "some assisted healers are bogus … the authentic healers do not want to be known … most of them are not" (Excerpt 8-12). This assertion reinforces the problem of rampant bogus healing practices in the community of Tendera as pointed out by Chief Tendera (Excerpt 6-17, p. 231). This explains some learners' views of integrative classroom science as important in developing in them the knowledge of identifying bogus and real healers and Elders (reason 8.2 (b) in Table 8-2 above). As such, romanticising indigenous knowledge (Briggs, 2005) may be tantamount to the failure to recognise that not all people who claim to hold knowledge of healing with plants are genuine. If this happens, then we integrate into the classroom science knowledge that is not representative of the Tsime knowledge of the people of Tendera. Then the whole purpose of integration that seeks to "double vision" (section 2.5.3, p. 68) learners to understand phenomena such as health, from both their indigenous and western science perspectives within the classroom context, would be defeated. This authenticity problem is traceable to both the open and closed nature of the Tsime enterprise that makes the knowledge it holds susceptible to anyone's claim. This observation has been explained in section 6.4 (p. 228.). In this regard, I argue that African culture stands to lose more from the misrepresentation of indigenous knowledge systems in formal schooling, than

if the indigenous knowledge was not integrated at all.

The participants also revealed that access to Tsime knowledge in the community of Tendera was problematic because it is sensitive, sacred and secretive. To this Elder Zuru said, "*Saka musina* information *nokuti varidzi varamba nayo modii*. *Hapana chokudzidzisa muzvikoro*" (Excerpt 8-11.). These sentiments mean that it is most likely that the holders of knowledge will refuse to disclose this knowledge. Without accessing this knowledge, there is nothing to teach. This unwillingness to disclose knowledge by its holders is also connoted in Ms Zivo's sentiments that

> the authentic healers do not want to be known … most of them are not ZINATHA registered ... do not want to release their knowledge … keep this knowledge in their hearts to graves … not easy for us to persuade them to give us this knowledge … How are we going to convince them? (Excerpt 8-12, p. 296).

In Chapter Six, it emerged that this knowledge disclosure problem is linked to its culturally secretive nature associated with assisted healing (section 6.2.3, p. 205), and also to taboos and rituals (section 6.2.3.5, p. 215). Actually, as far as four decades back, Mbiti (1969) indicated that indigenous people preserved and promoted their knowledge through secrecy, sacredness and communities' protocols and laws. Cultural taboos, such as *kufumura makwenz*i, show the participants' belief that disclosure of some hidden healing plants would lead to the loss of such plants' medicinal efficacy. The access to secret and sacred based knowledge problem injects sense into the learners' hope that integrative classroom science would provide them with opportunities to access some knowledge shrouded in sacredness and secretiveness (reason 8.2f, Table 8.2 above). Though this might be problematic, it might be difficult to change this long-standing nature of Tsime knowledge but, at least, the learners would understand the sacred and secretive nature of this knowledge body. This interpretation is backed by the observation that some African healers put in place taboos as a way of protecting their knowledge systems (Savage, & Fiador, 2004).

Some participants also attributed access problems related to secretiveness and sensitiveness to exploitative tendencies of some researchers. This comes out clearly in Elder Zuru's sentiments that "*Chimweno, iyi* area *yamabata iri* sensitive, *vanhu vanogona kumira kuti* why release this information. *Imo muno tose tine madzinde edu.* But why *zvanyonyi dii*?" (Excerpt 8-11, p.295). These thoughts expressed the distrust of people like me, the researcher, policy makers and other people held by some people of Tendera. Such participants suspected the

exploitation of their sacred and survival knowledge by people like me. They deemed such knowledge seekers as living in modernity of the white man's ways. Expressing such sentiments *sekuru* Moyo said:

> **Excerpt 8-13**: Modern people tend to be exploitative
>
> My sister, many of my people are asking me whether you were sent here by the government.[23] What then do you expect us to say (he looks up and down, drinks water) … We are selling ourselves to people who are black-whites (*varungu vatema*). You all live like them (whites). We were born like this. Why do you want now to teach it in schools? … our medicine works … you want to make money with us (looks down his cup, called his wife for more water) … simple and complex medicine … we are healthy … know no hospital doors … finish it all here. We are happy and healthy … I have no powers to say neither no or yes … *ndikadzipakata asi handinga- dziridze* (I am holding music instrument which I cannot just play). We will pass it on (referring to the spirits) … will do what needs to be done … wait to hear from them. We are just *midziyo* (tools) of what you are asking from us (he lights his African cigar from the fireplace and smokes) (Appendix A-01, December 5, 2013, CT).

Integration tension created by cultural traditions situated in modern life is also revealed in the above excerpt 8-12. Most participants, like *sekuru* Moyo, showed that they were caught between, not only political compulsions and cultural expectations, but also in the divide between rural and urban lives. Illustrative statements from which such tensions were drawn from Excerpt 8-13 above include "selling out ourselves to people who are black-whites". The concept of a "sell out" is linked to the second *Chimurenga* days in which such a person was regarded as a traitor, who gave out information on liberation fighters to the colonial Rhodesian government. Reference to "ourselves" relates to people in the rural community of Tendera who have retained their Tsime knowledge and therefore claim not to need western medicine. The second part of the excerpt describes the people in government and researchers like me, "black–whites", meaning those who have been absorbed by western ways of thinking and life styles. As such, they are black in race but white in lifestyle and ways of thinking. The excerpt also brings out the exploitative suspicion by questioning the reciprocity aspects of both the study and the integration reform itself. *Sekuru* Moyo expresses this by alleging that "… our medicine works … you want to make money with us".

[23] I did not deny whether you were sent here by the government or not because I thought it was leveraging my access. At the same time I did not confirm it as I thought it would jeopardise my relationship building).

Notably, these participants' fear of exploitation of their knowledge of plant uses for healing is substantiated in the literature. For example, the historical exploitation and abuse of indigenous knowledge without honouring its owners has long been noted and has led to the development of knowledge intellectual property rights (Warren, 1992). In fact, western-based pharmaceutical companies have been identified as the biggest indigenous knowledge bio-piracy perpetrators. It has been observed that these companies have tapped knowledge of plant healing from indigenous people for drug processing. Ironically, such companies, without due recognition of the indigenous people who have provided them with such knowledge, have gone ahead to patent their products. The Hoodia cactus plant bio-piracy is a well-known case in the Southern African region that awakened, not only South Africans, but other indigenous nations as well, into the importance of protecting their indigenous knowledge (Mashelkar, 2002). As I have argued before, communities can be encouraged to disclose this knowledge by giving them conservation and protection surety of their knowledge as well as the benefits they would reap from such projects. Doing so upholds their value of reciprocity that I have discussed in detail in section 4.4.4 of Chapter Four (p. 137).

Furthermore, other participants felt that the disclosure of Tsime knowledge through classroom teaching threatens the survival of healers' and Elders' cultural responsibilities and authority in their community. For example, Ms Zivo stated,

> … will we not train every child to be a healer. Are we moving towards modernising our traditional way of life? What then will be the roles and responsibility of our community healers? Is this not against our traditional beliefs? (Excerpt 8-12, p.271).

Whether integration of healing plants may or may not lead to either efficacy erosion or extinct authority positions, these sentiments suggest a cautionary approach towards integration, taking due consideration of these potential undesired effects. In fact, this finding is raising an ethical challenge. This challenge necessitates the observance of human rights and moral ethics stated in article 27 of the Universal Declaration of Human Rights: "Everyone has the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author" (United Nations, 1948). A dialogic space, where integrators find ways to move the integration forward without dismissing or diminishing aspects of the participants' knowledge and community roles, is necessary.

The challenge of the comparability of the effectiveness of both Tsime knowledge and western

medicine to integrative classroom science, was relatively rare. This was suggested by Ms Zivo when she pointed out that "we need to 'scientifically' establish whether the efficacy of these healing plants we will teach is better than that of modern medicine" (Excerpt 8-12). Emerging from this challenge is another challenge of knowledge validation for use in the classroom. It is insightful that the term "scientifically", in reference to western science shows that the majority of teachers judge the value of healing plants from the western phytochemistry perspective that blends with their beliefs in natural medicinal efficacy and disregard spiritual induced efficacy. This impresses the colonial position written about in literature (see Hewson et al., 2009; Shizha, 2007) that western science is relatively superior to indigenous knowledge. This comes as no surprise given that their learning of science, training to teach and experiences of teaching it are rooted in western paradigm oriented education systems (Hewson et al., 2009). Such underlying factors to comparative effectiveness and validation challenges can be seen as suggesting the need to decolonise the teachers' minds in order for them to be more amenable to integrative classroom science policies.

Other participants, particularly teachers and key participants related to education, held views that the greatest hurdle to integrating the Tsime knowledge into classroom science was its existence in an oral form. Such findings were drawn from sentiments such as those echoed by Ms Zivo that "it requires us to teach … when we have gathered authentic knowledge… how it really functions …" (Excerpt 8-12, p. 296). Ms Vimbo also said

> **Excerpt 8-14:** Lack of indigenous medicine text books is our greatest challenge
>
> [I]f we do not have textbooks on *kurapa kwedu uku*, how do we know what to teach? What I know is different from what the next teacher knows. In addition, the syllabus guides us on what to teach. The textbooks provide us with the content to teach. This knowledge is neither in the syllabus nor the textbooks. *Ndiro dambudziko racho*" (Appendix A-01, January 30, 2014, CT).

Apparently, the issues raised here tally with the findings in Mpofu and Muropa (2015) in which some in-service teachers in Zimbabwe who participated in their study: *Teach indigenous knowledge: We cannot teach what we do not know*, pointed out that the lack of documentation was one of the major problems they faced in their attempt to teach this knowledge form. Otulaja et al. (2011) argue that it could indeed be difficult for teachers to teach indigenous knowledge in their science lessons without documentation because they are immersed in textbook driven teaching traditions. Thus the teachers' recommendations that

this knowledge needed to be documented first before commencing its teaching in the classroom, was unsurprising.

The above revealed challenges are instructive on the degree of complexities accompanying the endeavour to integrate Tsime knowledge into the classroom science. They show that integrating IKoPH into classroom science is not just a matter of plucking out knowledge from the community and placing it into the curriculum. The issues involved are more complex than this. Whilst these participants were pointing out access challenges, they also revealed more Tsime knowledge aspects for classroom practices, for example, the natural efficacy of healing plants, knowledge protection, conservation and cultural taboos, among others. These will be pulled together with other aspects suggested in this section for a further analytical discussion in section 8-4 to follow.

8.2.2.2 Collaborations can alleviate integration challenges

In fact, most participants in this "yes - but" to integration also suggested strategies that we could adopt to overcome some of the integration challenges they raised. The need for collaborative ventures among teachers, healers, Elders and learners in accessing and documenting this knowledge body permeated participants' views. For example, Ms Vimbo underscored this collaborative approach stated in Excerpt 8-15 below.

> **Excerpt 8-15**: Work closely with others
>
> My experience is that Elders and healers do not easily release their knowledge to other … most of them are parents to our pupils … some of our pupils are more knowledgeable than us ... they practice this at home … before teaching we need to document more knowledge and correctly … work closely with our pupils and their parents … we cannot leave out the children,… knowledge disclosure depends on how you are related to the holder (Appendix A-01, December 26, 2014, CI).

This collaborative strategy suggestion comes with the realisation that teachers could be limited in both the breadth and depth of this Tsime knowledge as well as in their understanding of it. Such limitations are also cited in literature as a teacher related threat to the successful implementation of integrative classroom science reforms at classroom level (Hewson, 1998; Ogunniyi, 2007a). Essentially, such realisation leads to another recognition that children and Elders could be more knowledgeable than teachers in certain aspects of this Tsime knowledge. This is because, as shown in Chapter Six, every human member of the

community who participated in this study held substantial knowledge of plant uses for healing. In this regard, the classroom interaction opportunities unveiled in Chapter Seven (see sections 7.2, p. 243 and 7.7, p. 271) tallies with Ms Vimbo's own preparedness to learn from her learners and Elders. Such collaborations support the documentation of authentic Tsime knowledge that Ms Zivo argues for in Excerpt 6-12 above. Representing the learner's views, Chiedza, a Deve School learner and a granddaughter to *ambuya* Suma, expressed as follows.

Excerpt 8-16: Assist knowledgeable relatives

> My grandmother is now old. At times I help her dig out roots or get barks of trees and carry it home … I was not that interested in knowing what she treats people with these plants.… instead of waiting to be asked to help her I will volunteer to accompany her to the forests … ask her about what she will be doing. I will also see the plants and what they treat (Appendix F-01, November 11, 2013, CI).

Learning about the healers' knowledge field through assistance services has emerged in Chapter Six as one of the powerful ways of accessing the Tsime knowledge (see section 6.4.2, p. 229). The point here is, by assisting the knowledgeable person, the helper gains knowledge of healing through appropriation. More importantly is the realisation that, without the involvement of the knower, it will be difficult for the teachers to access and document knowledge for the classroom. These collaboration apprentice strategies suggested in Excerpt 8-15 above are also prominent in integrative classroom science because they are likely to develop in the learner a mindful sense of what Elders do that is important for classroom practices. Through such collaborations, learners will be able to connect their day-to-day experiences to classroom science, thus making science learning more relevant to them. On this, Ms Zivo added that:

Excerpt 8-17: Working together

> It requires working together … we put our heads together … teachers and pupils have knowledgeable relatives … if each one of us talks to his or her relative … no matter how secretive this knowledge is … we will build authentic knowledge ... may take quite some time before we teach it (Appendix A-01, November 2, 2014, CI).

Research conducted elsewhere, for example, *The cross-cultural science teaching: Rekindling Traditions for Aboriginal Students* (Aikenhead, 2002) and others (see Keane, 2005; Khupe, 2014), confirms the view that community and school collaborations are important strategies needed for successful integration of indigenous knowledge into classroom science. Some of

these studies have been described in more detail in the literature review, Chapter Two (see section 2.5.6, p. 75). These views also concur with the access approaches I adopted in this study detailed in Chapter Five.

Participants also impressed that collaborations teach and conscientise members involved in the integrative projects about the reform and its benefits. For example, village head Gomo said,

> The path we have taken with you has shown us how to survive in this modern world. Even the parents of the children you are working with are happy … It would be great if other children would learn what we have and their counterparts have also learnt (Excerpt 8-4, p.284).

The path referred to here is the collaborative journey in this project. This collaboration, as being suggested by these sentiments from village head Gomo, brought awareness to the participants about the importance of opening and valuing their knowledge. Arguably, this shows understanding of the importance of the integrative reform and its benefit to society. Collaboration then can potentially shift negative attitudes some teachers hold towards the integration process. Collaboration, as pedagogical strategy, is further reinforced here.

8.2.3 "No" to integration

The two assisted healer participants questioned the wisdom of integrative classroom science. They were of the idea that their Tsime knowledge was too complex to be handled in schools. They also viewed integrative classroom science as decontextualising their Tsime knowledge and fitting it into the western science frames of thinking, which is anti-Zezuru culture. For example, *sekuru* Miti could not agree to integration until he was appraised by his mediating wife that *tateguru* Dube, the spirit that tranced him had surprisingly sanctioned this idea (Excerpt 8-2, p.282). In the opening meeting with his team, *sekuru* Miti, with firmness, said:

> **Excerpt 8-18**: Modernising Tsime knowledge is anti-cultural
>
> This is ancestral knowledge not for school children ... *gwenzi rangu iri* (this healing plant of mine) runs back centuries of the family history … z*vinoyera* (it's tabooed) to spectacle this family knowledge … *hauyerekani wave nyanvi* (you cannot just in a moment become an expert healer) … *Inzira yechiraramo* (this is a life journey. He snuffs) … our ancestors will not agree to this … we all will be English and not people (Appendix A-01, December 3, 2013, CT).

The "school children" implied the children of Tendera who were learning at Deve and Gomo schools. The sense of this concept, as used by Elders of the community of Tendera, was suggested by Village head Gomo who said, "*zvinoitwa nevana vechikoro nematicha avo ndezvavo. Muno mumisha tinoita zvedu. Zvakatosiyana*" meaning "what they do in schools is theirs and the teachers. It is not what we do". So, *sekuru* Miti's sentiments in Excerpt 8-18 above impress that integrative classroom science holds a real danger of robbing them of their identity as Africans, or Zezuru people, to be specific. As such, there is a need, not only to protect the cultural foundation of traditional medicine, but also to conserve it within its cultural context. Such caution aligns with scholars such as Hermes (2000), Simpson (2004), and Battiste (2005), who are mindful of diluting indigenous knowledges through the processes of integration. Such scholars argue that the western science "dilution and swallowing" of indigenous knowledge would lead to the perpetuation of its subjugation and indigenous people's cognitive imperialism (Battiste, 2008). There are, therefore, real problems of teaching indigenous knowledge ideas out of context.

In Excerpt 8-19 below, *ambuya* Soko's reinforces *sekuru* Miti's views.

> **Excerpt 8-19**: This knowledge is for life, not schools
>
> Children … you are pursuing wrong … families are not stable … you teachers (pointing at me reproachfully) have lost our culture … men have become wives and wives man … not eating plants for intimacy … weak children … ignorant … not for schools … grandmothers' wisdom…. life is sustained by eating plants (snuffs and breaks into a cultural song-*chinotamba chigwaya munzira macho*-the bream is playing in its path) ... (points her cultural cloth at me and resumes talking in a different tone, her assistants clapped as gesture of respect. I figured out she was now in spiritual trance of *tateguru* Dziva). You … in search of living like the English and ignoring your ancestral talent … you think *mbarambadzo dzinodarika upenyu* (writing is more important than living) … The nation is now in trouble … laziness … immorality … ignorance … temperament … this can only be restored by people who have its wisdom. *Izvi ndizvo zvedu mambuya ka* (this is our zone of operation) (Appendix A-01, November 24, 2013, CT).

To these participants, learning about indigenous knowledge is an indication of the calling to be a healer. As such, classroom contexts have no capacity to develop the children into healers. These views are drawn from such sentiments, as "you cannot just in a moment become an expert healer" (Excerpt 8-18 above) and "you teachers have lost our culture … not eating plants for intimacy … weak children … ignorant … not for schools … grandmothers'

wisdom" (Excerpt 8-19). They made it clear that acquiring this knowledge had a practical function that, to them, was more important than teaching it in schools. So, learning about Tsime knowledge is best lived or experienced in a life journey, rather than being taught in an artificial context of the classroom. These arguments reaffirm the finding that Tsime knowledge is gained in natural settings throughout one's life and across life spheres that emerged in Chapter Six (see section 6.6, p.235).

Notably, these healer participants are re-echoing what participants in the "yes" to integration are concerned about, that modernity is degrading the cultural values of their community of Tendera. As a result, even professional educationists, like me, are not capacitated to handle Tsime knowledge in the classrooms. Logically, such incapability may cause teachers to resist the teaching of indigenous knowledge. Teachers' resistance of integrative classroom science in Zimbabwe and elsewhere has been reported in the empirical literature (Hewson et al., 2009; Ngara, 2007; Ogunniyi, 2007a; Shizha, 2007). Many other reasons that include attitudes, lack of knowledge and pedagogical skills, reform imposing on the teachers and the lack of teaching resources could be attributed to such teacher resistance. But, for whatever reason, the bottom line is that the complex nature of this body of knowledge is too challenging for teachers to handle without capacitation. Even those teachers, like Ms Zivo, who demonstrate substantial knowledge of this body of knowledge (as also established by Zengeya-Makuku et al., 2013), could face challenges of accessing this knowledge.

It was the view of virtually every participant in all the groups that the complex nature of the Tsime knowledge was a major challenge to its integration into classroom science. These views confirmed the complexity of Tsime knowledge that pervaded across all Chapter Six themes. All the participants like *sekuru Moyo* simply expressed this complex nature by oxymoronically describing it, that is, in two opposite ways. He said it was "simple and complex" (Excerpt 8-13, p. 299), relating to this knowledge form's physical and spiritual characteristics (see section 6.6, p.235). Even the participants in this "no" category seem to doubt that the complex Tsime knowledge could be integrated into classroom science, especially with a culture distinct from theirs. It probably came from a fear of the unknown. This being the case, collaborating with such people in a similar way to the way I and others have done may be helpful in convincing them of the need not to be afraid of the dissemination of their knowledge within classroom settings.

Indeed, integrating Tsime knowledge into classroom science is a complex and demanding

exercise. Evening Ogunniyi (2013), a renounced scholar in African indigenous knowledge personally communicated this when he said:

> I have experienced many challenges in my journey as an African indigenous scholar and science educator. This includes getting my writing rejected in the western dominated academy publications. But I said they do not know me. With determination and perseverance I finally made a break- through. So I find out that everything that ends well has a beginning. We have to start from somewhere. At the end, our accumulative efforts will reap the desired results.

The above quote recognises both the challenges accompanying the integrative classroom science and the need to start this process. It was encouraging that all the participants contributed various ways in which to teach their Tsime knowledge in classroom science. Ironically, even those participants who were not for integrating Tsime knowledge into the classroom, had some suggestions to offer. The next section discusses the coexistence approach to integration that the participants suggested.

8.3 Co-existence integration

Figure 8-1 below conceptualises the co-existence frame to integration that permeated the participants' voices on integration. The direction of arrows (left to right) in Figure 8-1 below show a number of possible integration pathways the participants suggested within this co-existence frame. In this section and its sub-sections, I examine each of the suggested pathways to integration. I follow up this by choosing the most reasonable pathway for possible integration of Tsime knowledge into classroom science based on the strengths found in its assessment. This selected pathway will then, in sections 8.4 and 8.5, be used to demonstrate how integration could be done.

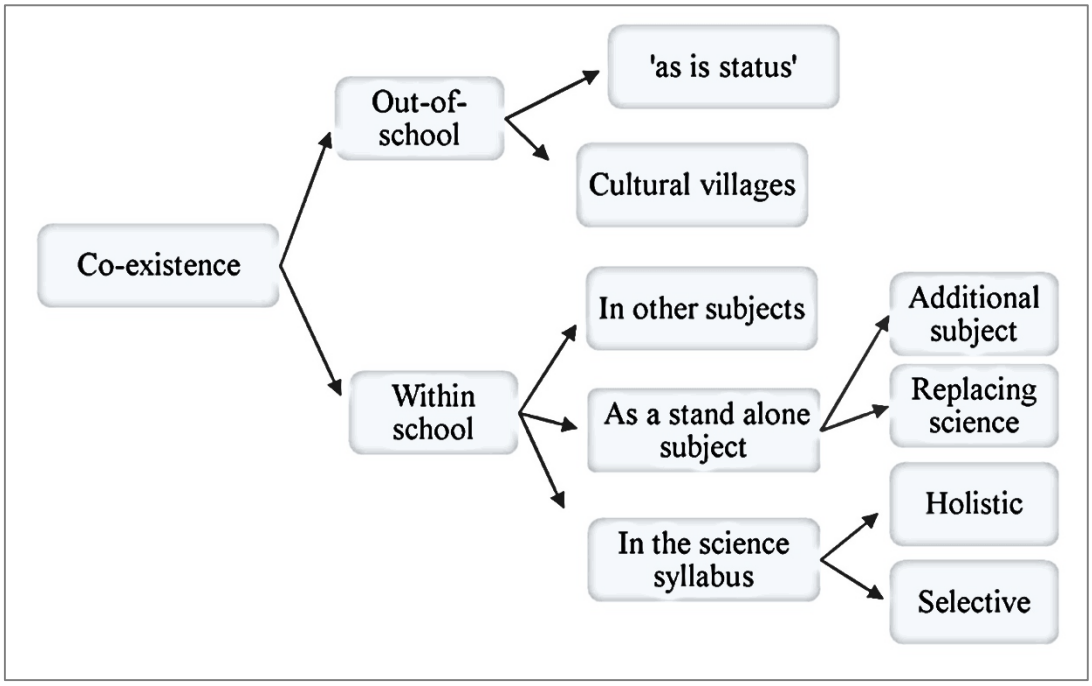


Figure 8-1: Co-existence frame of integrative classroom science

The participants held two meanings of co-existence in relation to Tsime knowledge and western medicine/science. The sense of dissonant co-existence of two knowledge systems within a community emerged from the participants' regard of one knowledge body as relatively superior to the other. For example, the statement that "Healing with plants is not new to our community. It is part of us … we have lived with it ever since" (Excerpt 8-1, p. 281) shows that, in the community of Tendera, the indigenous healing and western medicine services have a long history of existing together. However, the expression that "we have learnt that we need to seek healing and practice it from our own people and culture in the same open manner we do with Christianity and Hospitals" (Excerpt 8-4, p. 284) further suggests an unbalanced status of existence in favour of western medicine. In the literature (e.g. Hewson, 2012; Shizha, 2014), such unequal status of knowledge existence in African communities has been traced to colonially introduced prejudices and subjugations. The Contiguity Argumentation Theory (CAT) shows that it is not a misnomer for an individual to hold the dominant and suppressive views of two knowledge systems (Ogunniyi, 2007a). This theory further elaborates that such co-existence relationships are not static in all situations, but rather alternate as driven by circumstances. In fact, there is ample evidence in the data to show that most participants viewed western medicine as better than Tsime knowledge at overt level. The fact that Tsime knowledge was still in existence in Tendera at the time of study (see Chapter Six) gives a strong indication that this body of knowledge also dominates

western science at secretive cultural levels.

Other participants expressed desire for a harmonious co-existence of their Tsime knowledge and western science in science education. To such participants, harmonious co-existence implies that their Tsime knowledge would be equally and amenably valued in classroom sciences. Such views were drawn from the participants' opinions of spirits as having been suppressed (see Excerpt 8-2, p.282), the exclusion of Tsime knowledge in the classroom science, and the decolonisation justifications for integrative classroom science (Excerpt 8-1, p. 281). Actually, most integration voice data connoted this. All the "yes" and "yes - but" to integration are interpretable as pointing towards this form of co-existence. The idea of moving indigenous knowledge into classroom science teaching and learning in ways that promote its harmonious co-existence with western science, has been the goal for many such research projects. For example, Aikenhead (2002) reports that co-existence of both Aboriginal and western sciences was a celebrated outcome of their Rekindling Traditions project. He further advises that co-existence integration was "an essential condition to culturally sensitive instructional strategies and to a postcolonial science education" (Aikenhead, 2002, p. 294). Arguably, harmonious co-existence of the indigenous knowledge and western science in science education holds the potential of instilling in learners equipollent thinking. Research has further shown that such thinking develops in learners a sense of pride for their cultural identities and heritage and, at the same time, they come to understand western scientific worldviews better (e.g. Aikenhead, 2002; Lee et al., 2012).

8.3.1 Out-of-school

A few participants believed in keeping their knowledge out of school and retaining it in the community of Tendera where it has always existed. This finding is drawn from the data such as, "This is ancestral knowledge not for school children" (Excerpt 8-18) and "we cannot do it" (Excerpt 8-12). Actually, most data in the "no" to integration suggested that we keep our knowledge "as is the status" in relation to western science. This form of integration maintains the current status quo. This being the case, it is most likely to perpetuate the domination of western science in classroom science and the exclusion of Tsime knowledge from the curriculum. As such, it is not beneficial to the endeavours of integration because it promotes a dissonant existence of Tsime knowledge and western science in the classroom. But it is useful in as far as it brings out the position of participants to integration that requires the integrators to engage with them in dialogue to gain their support for integration. This is where

collaborative ventures become useful awareness tools.

The notion of the cultural village integration was suggested by the teachers and officers in the Ministry of Education. For example, Ms Vimbo said,

> **Excerpt 8-20:** Use of village homes as resource centres
>
> We can also use some homes like the Kiza up there. You can see it on your way to this school. Many people visit this place. We can observe that they do like what some teachers here have done (Appendix A-01, December 26, 2013, CI).

Notably, the notion of cultural villages or centres in the form of cultural huts was already in schools. However, it differs from the cultural village integration as the data suggests that huts are built within the school premises. These huts and the teaching of culture are under the auspices of teachers, not community Elders or healers. Yet, the use of cultural villages means recognising knowledge holders and using such villages as cultural resources from which Zimbabwean educators, particularly teachers, can draw Tsime knowledge teaching materials for integration in school. I found this concept of cultural village integration resembling the Old Minto Cultural Camp by Alaska Native Knowledge Network (ANKN) as cultural resource centre (see section 2.5.6, p. 75). It supports pedagogical fieldwork or an outdoor approach to the teaching and learning of Tsime knowledge. Such an approach provides a learning environment within the context in which Tsime knowledge is comfortable. It supports a harmonious co-existence of western science and Tsime knowledge.

8.3.2 Within school

All the participants who were for integration suggested the "within school level of integration". Even the "yes" to integration suggested the long run within school integration. The participants, mainly teachers, officers in the Ministry of Education and learners, suggested placing Tsime knowledge into different school subjects as shown in Figure 8-2 below. This was unsurprising in view that the Elders and healers were not in direct interaction with the school curricula, which are subjects offered in schools.

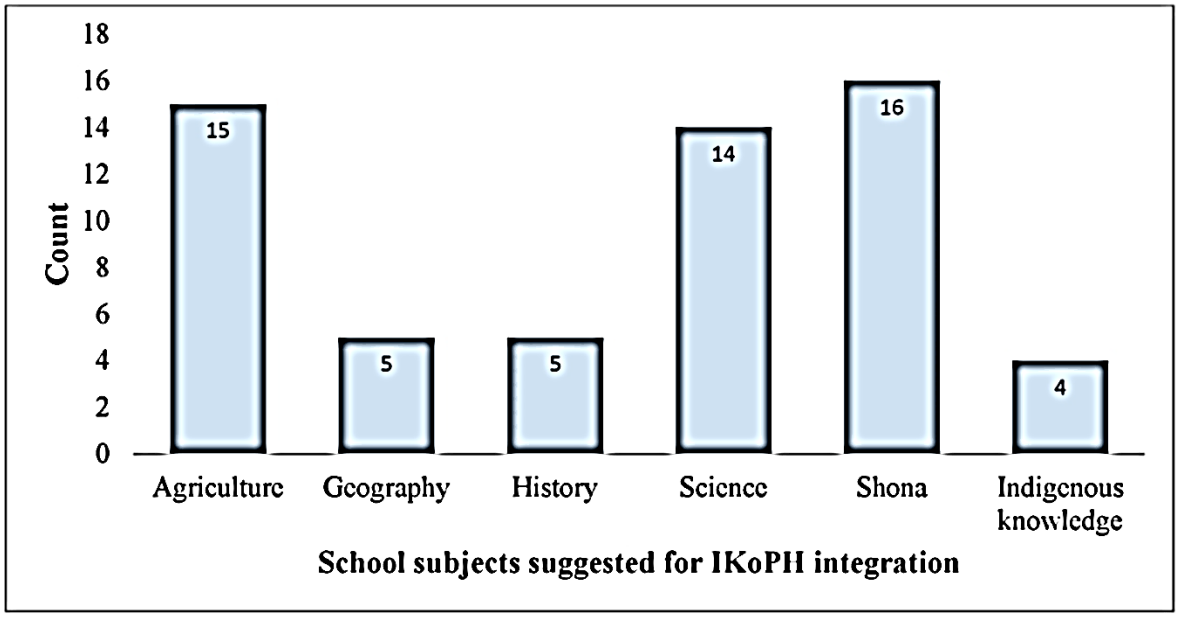


Figure 8-2: School subjects appropriate for Tsime knowledge learning

As Figure 8-2 shows, some of these participants saw fit to integrate Tsime knowledge in subjects (Agriculture, Geography, History and Shona) other than science. The most preferred subject of placement with a total count of 16 was ChiShona (Figure 8-2 above). Supporting the idea of integrating the teaching of Tsime knowledge into ChiShona, which other participants also concurred with, Mr Choto said in the following Excerpt 8-21:

> **Excerpt 8-21**: Time knowledge can be taught in ChiShona
>
> You cannot teach one culture in another culture (refers to English and science) … real culture involves *vadzimu* (ancestral spirits), *mabira* (traditional ceremonies), *mafuwe* (rain ceremonies), *ngozi* (avenging spirits) … real deep cultural knowledge … This is what Shona means … the experienced Shona not the book Shona … (Appendix A-01, December 3, 2012, CI).

In this Excerpt 8-21, is the recognition that language, culture and knowledge are inextricably connected. This is because language is central to culture and knowledge development (see section 4.4.5, p. 138 and section 7.6, p. 264). It is tied to the context/place in which it is spoken and it provides its speakers with a cultural identity and understanding through communication. Accordingly, teaching Tsime knowledge in a subject whose instructional language is English and whose knowledge language is technical, like science, might misrepresent the Tsime knowledge in classroom science. Furthermore, these participants also felt that teaching Tsime knowledge in other subjects that were taught in English is likely to

perpetuate the difficulties participants already were experiencing. On this, Ms. Vimbo said:

Excerpt 8-22: Language of knowledge and knowing

> These children have learnt and are learning it (IKoPH) in Shona in their homes. We need to teach them in this very language. It is the language of the subject. These learners are already struggling with the understanding science that we teach in English … English itself is a problem to them. … will understand better … some Shona knowledge and cultural experiences cannot be translated into science knowledge (Appendix A-01, February 20, 2014, CI).

The argument on the teaching of Tsime knowledge in English that is an alien language to the ChiZezuru first language speakers, is likely to encounter dissonant coexistence. Educators must find ways to integrate indigenous knowledge of plant healing with its language to enable learning. Failure to do this results in a failure to learn both Tsime knowledge and western science. The relevant purpose of integrating this knowledge form into classroom science then becomes defeated. Even learners themselves supported what Chioniso said, "I do not want to learn it [Tsime knowledge] in English because it is not my language. It is difficult to understand". The reasons behind the placement of Tsime knowledge in ChiShona were succinctly put by Vari in Excerpt 8-23 below.

Excerpt 8-23: ChiShona is our language

> ChiShona is my language, it is understandable. I will have no problems with understanding what will be taught. Furthermore, ChiShona is the language of *kurapa kwedu kweChibhoyi* (indigenous healing). At home, we know it (IKoPH) in Shona … our Elders do not know English [Appendix F-01, October 16, 2013, CD).

To these participants, the learning of Tsime knowledge in English, being a foreign language to the children of Tendera, would hinder their understanding of Tsime knowledge. Yet, learning it in ChiShona as their home language, would enhance the learners' understanding of it. This is because the learning of knowledge in its language involves easy crossings of internal language, knowledge and cultural borders. On the other hand, the learning of Tsime knowledge in English would introduce external border crossing which are more difficult. Actually, it has been long recognised by cultural science education and indigenous knowledge scholars (e.g. Cobern & Loving, 2001; Gardner, 2000) that language is central to shaping identity and worldviews. Integrators of Tsime knowledge into classroom science, therefore, need to be aware of, not only the learning challenges in teaching Tsime knowledge

as culture in a different science culture, but also losses of some of this Tsime knowledge that come with decontextualising it from its language. These findings are reinforcing the language issue that I discussed in detail in Chapter Seven (section 7.6, p. 264).

Like Mr Choto is expressing in Excerpt 8-24 below, some learners felt that even teaching Tsime knowledge in the subject of ChiShona might misrepresent the Tsime knowledge in the classroom. Following is the Excerpt 8-24 in which he said this.

> **Excerpt 8-24**: Culture is deeper than symbolic representations
>
> It is quite unfortunate that the new department of culture (now a Ministry of Culture and Sport) has misinterpreted our culture to mean cultural huts and a few artefacts like drums, wooden plates, mats, and *etcetera* you find stocked in those huts … in the schools. But this is neither culture no Shona (snuffs) … it repulses me to think that people substitute traditional dance with culture. They are ignorant because they read about Shona in textbooks and novels rather than experience it (Appendix A-01, December 3, 2013, CI).

Accordingly, ChiShona in textbooks has not been written with the goal of building onto the learners' knowledge. Mr Choto brings to our attention that

> IKS (indigenous knowledge systems) are not just about artefacts, but the epistemologies, ontologies, and metaphysical systems underpinning these artefacts and the way they are used to create a sense of wholeness, relatedness, or complementarity amidst a collocation of human dilemmas (Ogunniyi, 2007a, p. 265).

Thus, as Mr Choto is indicating, a focus on symbols merely scratches on the surface of Tsime knowledge that would shallowly represent it in the classroom science. This focus on "woven baskets" and "traditional dances per se" (Oddora Hoppers, 2002) is tantamount to oversimplifying indigenous knowledge in the classrooms. This is a powerful message, that the integration of Tsime knowledge should reflect all of its natures, even if it was to be integrated into any other subject.

The idea to introduce the teaching and learning of Tsime knowledge in agriculture was also popular among learners as shown in Figure 8-3 above. Such learners were of the opinion that the learning of "indigenous gardening and tree planting" (said Ishe), and "usage of plants to manage the health of domestic animals and birds" (said Kein), fitted well in this subject. Such thinking concurs with the practical nature of Tsime knowledge. To these participants, Tsime

knowledge was practical and would fit well within the context of a practical subject like agriculture. In ChiZezuru culture, like my Karanga culture, probably all Shona cultures, domestic animals are highly valued. Locating this knowledge in Agriculture was beneficial for the health management of their domestic animals. The other main reason that was put forward for locating Tsime knowledge in agriculture was that agriculture is part of geography. "This is where we learn about trees, forests and vegetation", Tino added. It could be argued then that, to these people, the learning of Tsime knowledge in agriculture enhances the relevance of school education. But, sadly, it might also indicate that such learners do not see their knowledge as a form of science. This makes it even more important to teach indigenous knowledge in schools.

The proposal made by some participants to place Tsime knowledge in History was linked to the Zimbabwean nationalist and ancestral history. In particular, they pointed out the spiritual component of Tsime knowledge made it appropriate for learning it in History. The role spirits (e.g. Nehanda) played in Chimurenga wars appeared to have influenced such reasoning. To this, Ms Zivo said, "Spiritualism is best understood in History because that is where this knowledge is taught". Such views reinforce *tateguru* Mukono's assertion that western education is powerful. This "fit in different subjects" tenet of Tsime knowledge could be linked to the compartmentalised perspectives of western knowledge systems. At the same time, it reaffirms the holistic nature of indigenous knowledge. Holism describes indigenous knowledge's all-encompassing and scientific disciplines, humanities, languages, technology, politics, culture and spiritualism (see Battiste, 2002; Oddora Hoppers, 2002; Ogunniyi, 2005). This causes the dilemma of integrative classroom science of whether to extricate aspects from this cultural matrix for integration at the expense of its holistic representation, or to integrate it wholly to give it its full picture in the classroom. The all-aspects integration holds challenges for teachers who might be required to extend their taxonomic western science knowledge to embrace also a holistic view of knowledge. The answer lies with paying particular attention to what the participants say about all aspects of integration. Attacking the problem from a holistic picture may inform appropriate decisions.

Some learners proposed the development of the new Tsime knowledge syllabus to be taught as a subject on its own. Two arguments emerged from learners' discussion sessions in support of this proposal. Presenting one school of thought, Rujeko articulated that "the Shona of *kurapa* (healing) is different from the Shona we are learning, so it is better we learn this as a subject like we do other subjects". This reminds us that Tsime knowledge, like all of other

knowledge systems, is held in its technical language. Other participants who shared the view expressed by Tinei, said, "It gives others who do not want to learn about z*veChiVanhu* a choice not to attend such lessons". This coincides with the thinking that placing Tsime knowledge in agriculture makes teachers "know why we do not want to do some things … like slaughtering white chickens that they force us to do in agriculture" held by some learners like Ropa and others. This raises issues of children's rights to academic freedom and respect for other people's beliefs. To such participants, integrative classroom science means respecting other people's choices and beliefs. Failure to do so is a possible area for tensions and contradictions in the learning of western science and Tsime knowledge within the same classroom space. Such beliefs, if not handled carefully in science, may even cause more dissonance that can work against integration. Hence, the need to be culturally sensitive and strike a balance on what to integrate or not to integrate in the classroom science.

Unique from the Chief of Tendera, was the suggestion to displace western science in the syllabus with Tsime knowledge (Excerpt 8-5, p. 285). This moves Tsime knowledge into the school curriculum by substitution that reverses colonial deeds. This pathway not only keeps the two knowledge bodies apart, but also envisions Tsime knowledge dominating over western science, medicine or classrooms. In this way, it promotes the same dissonances that the integrative classroom science is aiming to solve. As such, this approach may be considered retrogressive, and therefore difficult to implement.

Fifteen (15) learners supported the learning of Tsime knowledge in science (Figure 8-2 above). To these participants, integrative classroom science created opportunities for them to understand the full functions of healing plants. Expressing such ideas, Chioniso explained, as shown in the following Excerpt 8-25.

> **Excerpt 8-25**: Whole part and biochemical component
>
> At home we learn what treats what …. *jeka cheka* treats dysmenorrhoea, *munhunguru* treats diarrhoea … we do not know why these plants treat what they treat. Our parents do not tell us why … We are told how to use some plants in the event of illness … we see them using some plant parts. I am hoping that in science, our teachers would teach to us to know why (Appendix F-01, December 4, 2013, CD).

This Excerpt 8-25 expresses the learners' desire to learn Tsime knowledge beyond the "what and how" practical level they were taught in their community to "it heals because" explanation level. To these learners, relevant integration means its ability to link the two

knowledge systems in their different ways. Aligned to these thoughts was also the pupils' proposal that placing Tsime knowledge in science is crucial for understating the link between their local plants and drug manufacturing. This affirms the need for integrative classroom science to provide the natural efficacy of healing plants. Ms Zivo emphasised this in Excerpt 8-26 below.

Excerpt 8-26: A focus on scientific aspects

> We can teach about the plants … simple and proven plants … like barks, leaves, roots, fruits … learners can confirm these for themselves in class even. Their medicinal properties are experimentally verifiable … for instance, the testing for pregnancy of lactating mothers … a baby who consumes such milk will become ill … if the Elderly women such suspect a young mother, they ask her to boil their milk … it sours if one is pregnant ... a simple experiment that can be proven … not difficult to convince learners … it prevents baby unnecessary illness (Appendix A-01, February 11, 2014, CI).

These issues are raising the issue of knowledge validation. To them valid Tsime knowledge is that which has been subjected to laboratory analysis. But indigenous scholars would argue in the way that Michell (2005, p. 37) concludes for Woodlands Cree that "cultural knowledge needs no validation from Euro-Western knowledge systems". This is because

> [m]any of the core values, beliefs, and practices associated with those worldviews have survived and are beginning to be recognized as being just as valid for today's generations as they were for generations past (Barnhardt & Kawagley, 2005, p. 9).

I also established that, in many cases, this knowledge system is self-validating. For instance, some healing claims such as the treatment of wounds would be confirmed through observed treatments. Such validation difference is another tension that calls for the respect of differences in order for the two knowledge bodies to co-exist harmoniously.

That teachers are focussing on knowledge that conforms to western scientific boundaries is unsurprising given their western education based academic background. These teachers' views are influenced by the western science descriptions of the nature of science. This means that teachers need re-learning in order to accommodate the idea of multicultural science.

In summary, these Tsime knowledge placements in subjects (e.g. Shona, History, Geography, Agriculture and Indigenous knowledge as an additional subject) other than science, blend well with the side-by-side teaching of Tsime knowledge and science within the school. Save

for indigenous knowledge, these subjects are already being taught in the two local schools parallel to each other and to science (see Table 3-4, p. 111). This "fit in other subject other than science" approach to integration can be interpreted as suggesting an "outside the science subject" parallel approach to integration that means that Tsime knowledge takes a parallel approach to integration. This "within science syllabus parallel approach" branches into two forms. One is the holistic form emanating from the ideas of participants that all aspects of Tsime knowledge need to be integrated into the teaching of science. The other is selective form drawn from some participants' views that only knowledge conforming to western science needs to be integrated. What I found conspicuously missing in the data was any suggestions towards convergence integration. It is probable that participants were afraid of their knowledge being swallowed up by western science. Such an outcome has the consequence of repeating colonialism.

This dual sense of co-existence shifted my initial understanding of quadruple integration pathways (see section 2.5.2, p. 64 for more detail) that guided my integration analysis. This qualified parallel integration to mean the side-by-side harmonious co-existence of Tsime knowledge and western science. In convergent integration, there would be no co-existence of these knowledge bodies, but rather a new hybrid knowledge formed from the synthesis of the two knowledge bodies found in classroom sciences. This leads to an outcome where "the results of the successful interaction between these two cultures through dialogue based on mutual respect may be different types of science" (Hewson, 1988, p. 325). This perspective lends convergent integration to another form of harmonious co-existence integration. But it holds consequences of the dominating knowledge (western science) swallowing the suppressed knowledge (Tsime). This explains the reserved position taken by these participants and other indigenous scholars. They fear this kind of integration.

In addition, this dual sense of co-existence has modified the sense substitution integration to mean a divergent variant of integration to the status quo or "as is status" type. Accordingly, these forms of integration support dissonant co-existence of western science and Tsime knowledge.

The manifold options for co-existence integration suggested by the participants evoke a question of how to proceed with integration from these several choices. It would be difficult to choose one pathway based on participants' preferences. Notwithstanding this challenge of whose suggested pathway to follow, these several routes give integrators alternatives to

consider based on their contextual factors. For example, the cultural village may be a more appropriate pathway in the transition phases to “in school integration”. This is because it gives integrators (researchers, teachers, policy makers, learners and community members) ample time to conceive the idea, learn from each other and develop materials for classroom science. Deciding on an integration pathway is a necessary step towards solving the integration challenges that the participants identified and implementing the solutions they suggested. However, this phase, as shown in the above discussion, involves the research approach.

The answer to this question is suggested in the title of this study phrase, “integrating IKoPH into classroom science”. The preposition “into” implies the movement of one thing to enter the other. In this case, Tsime knowledge is to be moved from the community of Tendera into the westernised science syllabus. As such, a pathway or pathways which agree with that suggested by the opportunities for integration analysis in Chapter Seven become appropriate. This is the “within science” subject parallel integration. Based on this discussion, this study conceded to the co-existence of parallel integration as a suitable frame for illustrating how Tsime knowledge could be integrated into classroom science. This is the best approach given that it gives both the knowledge bodies their cultural identities as well as potentially develops the “double visioning” knowledge and skills in the learners. This answers the pathway question: How could Tsime knowledge be moved into classroom science?

Having identified the appropriate frame for integration, I now move on to exemplify how Tsime knowledge content could be fitted into classroom science, based on what participants have provided as data.

8.4 Synthesising Tsime knowledge aspects for classroom science

Tsime knowledge aspects for classroom science were consolidated following three basic stages. Firstly, the aspects suggested by participants’ voices on integration were identified in accordance with the holistic classroom science model. The identification of the Tsime content was based on the assumption that the subject content was a product of knowledge selected from all the hepta (seven) dimensions of the Tsime knowledge. The second stage involved identifying specific elements that were suggested for classroom science. The third and last phase involved fitting these knowledge aspects into the ZJC syllabus areas identified in Chapter Seven. These phases are discussed in detail in the following sections.

8.4.1 Participants voices on Tsime aspects for integration

Several aspects of Tsime knowledge suggested for integration into classroom science were identified from the participant's voices on integration. Table 8-3 below lists some of these aspects for illustration purposes.

Table 8-3: Tsime knowledge aspects suggested for classroom science

Classroom science dimensions	Participants' suggested aspects for classroom dimensions
Purpose	• Understand cultural perspective of managing health • Enhance IKoPH for uses in everyday life • For future complementary medical practices • Understand the function nature of Indigenous knowledge of plant healing
Content	• Indigenous perspective of health • Prevention and treatment of ailments • Nature of indigenous knowledge of plant healing • Medicinal efficacy • Culture and • *Unhu* • Spirituality in healing with plants • Importance of plants for healing • Indigenous knowledge of plant healing language
	• The healing enterprise • Sex and sexuality
Pedagogy	• Working together/collaborations/group work • Fieldwork/observations • Practical or learning by doing
Enterprise	• Healers and Elders as cultural consultants • Teaching responsibility for teachers
Language	• Shona as medium of instruction • Shona as language of the subject
Place	• Community • Classroom (laboratory)

Table 8-3 shows that most of the suggested aspects for classroom science are broad. For

example, drawn from the participant's voice, "… our children should also learn about our cultural ways of managing health" (Excerpt 8-1, p.286) is the goal that learners need to "understand cultural perspective of managing health". Specific objectives from these goals need to be identified from the Tsime resource. In such a case, the next thing would be to identify specific topics from the Tsime reservoir as is illustrated below.

8.4.2 Specifying Tsime knowledge aspects

Knowledge aspect specificity is defined in two main ways. First, by examining the knowledge aspect in the Tsime. For example, the specific content prevention and treatment of ailments like cancer can be drawn from sections 6.2.3.3 (p.210) to 6.2.3.5 (p.214) of the documented Tsime knowledge. Other times, drawing this knowledge from the Tsime knowledge requires a theoretical understanding of the topic. Such theories were drawn from literature. For example, the specific topic of Culture can be understood from cultural egg model (Figure 2-2, p. 35) of Kato (1976). According to this model, culture is multi-layered. The formal or symbolic manifests in levels of culture that include the values, myths and philosophy. Symbols of culture include songs, ceremonies and rituals, poems and incantations. The specific topics to be taught under the topic Culture from a Tendera perspective were examined from the type of symbols that were generated with the participants and documented as Tsime knowledge in Chapter Six. For example, *Unoziva* is symbol of Tendera culture. Its analysis (section 6.1, p. 187) revealed several concepts of culture listed as follows:

Culture

- Holistic community
- Community membership
- Membership relatedness
- Animals
- Plant healing functions
- Plants
- Life and health
- Trees

The second layer of this model represents myth and value levels. The analysis of myths (collection of stories explaining nature, history, and custom) leads also to the identification of Tsime content. For example, Clara's story can lead to the teaching of wound medicine. The community values, such as secretiveness and reciprocity, could be identified from the axiological frame (Figure 4-2, p.134) of the people of Tendera. They also could be drawn from the Tsime resource, such as the concept of cultural secrecy (Excerpt 6-5) in relation to the uses of plants for healing. The third layer relates to the philosophical level that has been

identified in the community as *Unhu* and *Ukama*. The song "*Manyanya kuchera mishonga*" (Appendix A-01, March 21, 2014, CT), says in literal English: "You are overharvesting medicinal plants" is another example from which content of conservation and respect for plants can be drawn by members of the community. Doing this is one way in which to identify content for teaching. This answers the content question: what Tsime content could be taught?

Through similar analysis, who should teach this knowledge from the participants' perspectives was also established. The participants agreed that the teaching of the Tsime content needed to extend to Elders in the community. To the Elders and healers, such responsibility lies with teachers, but these teachers need to be knowledgeable. However, learners had varied suggestions on who should teach Tsime knowledge in the classroom as depicted in Figure 8-3 below.

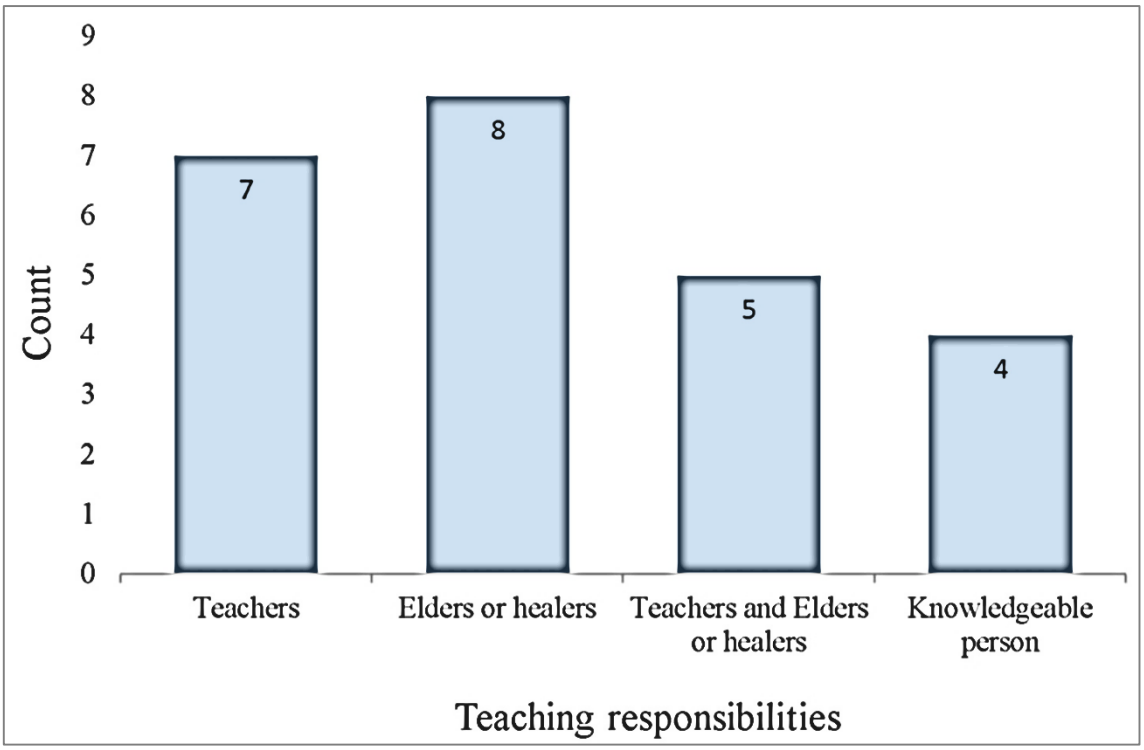


Figure 8-3: Pupils' suggestions on teaching responsibilities

To the majority of the learners the responsibility of teaching them about Tsime knowledge in the school context lies with the Elders and healers. The two core participating teachers, including other key participating officers across the three ministries, said that the teaching of Tsime knowledge in the school setting was an obvious task for teachers. It puzzled me that Elders and healers also emphasised that it was the teachers' responsibility. The following

Excerpt 8-27 below exemplifies some of the expressions from which I inferred teacher responsibilities. In this excerpt, Chief Tendera said:

> **Excerpt 8-27**: A responsibility of teachers
>
> We are not teachers … have our own work to do … a lot of it … it's their (teachers) work ... Is it not that they employed to do so? It is in our culture that the teachers come to us … when they do so we give them the go ahead. Help them … show them the way to sacred places and ancestors of the land … tell them what to teach … I am interested in *Unhu.* We cannot linger in schools. For what? They are our children … in the homes we do what has been done in honour and respect of our forefathers. This land is not mine … Do you think we can do this in schools? [Appendix A-01, March 30, 2014, CT).

This responsibility for the teachers presents two relationships with earlier studies. First, it disagrees with some researchers, like Thomson (2003) and Aikenhead (2002) on the idea of inviting Elders and leaders into the classrooms. The other is the community Elders and healers' preparedness to participate in curriculum development. It is clear from Excerpt 8-27 that community Elders and healers are not prepared to be involved in the teaching of Tsime knowledge in the school context, rather they viewed themselves as "cultural consultants". This means that the teachers and learners need to visit the Elders and healers in their homes for cultural guidance. To my Shona cultural knowledge, the visits to Elders by teachers and learners for teachings is an expected cultural gesture of respect.

The Chief of Tendera suggested I took up this responsibility when he said, "it starts with you (me), teaching our children about *ChiVanhu*" (Excerpt 8-5, p.285) But this was rather metaphoric as I interpreted that he and other Elders viewed me firstly as a science teacher. At the same time, they viewed my seeking of cultural knowledge as equipping me to handle the teaching of this complex body of knowledge in schools. The message here is that teachers need to be knowledgeable about Tsime knowledge to teach it appropriately. This aspect of teaching responsibility has also been indicated in Chapter Seven. While the Chief and other Elders consider it the responsibility of teachers who are knowledgeable about both (Tsime and curriculum content), the integration lies with extending the teaching responsibility to community Elders (See section 7.2, p.243 on nature of enterprise).

In contrast, the second group of pupils suggested that Tsime knowledge components needed to be taught by the Elders or healers because they are more knowledgeable than teachers. Such learners did not see themselves and teachers as potentially rich sources of Tsime

knowledge. Others, like Chiedza, shared the view that any knowledgeable person could teach Tsime content in the school setting because “we know different things”. To these learners, Tsime knowledge is neither a monopoly of teacher expertise nor Elders/healers, but rather it depends on what ought to be taught. This agrees with the integrative opportunity of extending classroom science activities to involve the community people (See section 7.2 of Chapter Seven).

The last group recommended that it would be better if they were taught by both teachers and Elders or healers. The need for collaboration is being reinforced here. Collaborative teaching suggests an extension of teacher roles that calls for the adoption of a myriad of attributes. Such roles may be context-specific with overlapping roles of coordinator, teacher and learner that I adopted (see Chapter Five). In turn, these roles suggest that teachers become researchers and reflective teachers.

8.4.3 Pedagogically fitting the aspects into classroom science

The participants revealed various oral arts, such as songs, dreams and community stories rich in pedagogically fit options for Tsime knowledge teaching in science classrooms (see Chapter Six). I present here two possibilities that could be used in combination to teach Tsime knowledge that emerged from data gathered. I labelled these “oral based pedagogy” and “spiral lesson(s) sequencing”.

8.4.3.1 Oral based pedagogy

I use the phrase “oral based pedagogy” to describe teaching approaches grounded in the content of oral forms of knowledge. Those emergent in this study include songs, stories (community, fables), poems, cultural laws (taboos) and protocols (incantations), metaphors (proverbs, idioms, riddles and similes), rituals and ceremonies. Almost without exception, scholars who write about indigenous knowledge and borrowing from it pedagogical aspects into the classroom, emphasise orality. However, most of these studies do not go any further than making statements of recommendation. This study addresses this aspect of how cultural pedagogies are developed from oral sources of knowledge. I now turn to do this and use Excerpt 8-28 as an example.

Excerpt 8-28: Trees and baboons game song

Dede muzengerere	**A baboon swings**
1. Dede muzengerere, Uyu mutii? Meremberembe Zenguurize paya tsve	A baboon swing on tree branch, What tree is it? A Cassia abbreviate/ Swings to and fro and stops
2. Dede muzengerere Unorapci? Mudumbu. Zengurize paya tsve	A baboon swing, What ailment does it treat? Stomach ailments Swings to and fro and stops
3. Dede muzengerere Unorapa sci? Mashizhizha manyoro akaoma Woisa mumvura nokunwa Zengurize paya tsve	A baboon swing on tree branch How is it used? Crush fresh or dry leaves Add water and drink Swings to and fro and stops
4. Dede muzengerere Wazviziva sei? Nambuya, sekuru, baba, amai Vana, masahwira nen'anga Zenguruze paya tsve	A baboon swing on tree branch How did you know it? Granny pa and ma, father and mother Peers, Elders, and healers Swings to and fro and stops
5. Dede muzengerere Unomuonepi? Musango, mugomo, makura Zenguurize paya tsve	A baboon swing on tree branch Where do you find the tree? In the forest, mountains, fields Swings to and fro and stops
6. Dede muzengerere Unomuziva sei Zvivana, mashizha, makwati, Zvauri zvese Zenguurize paya tsve	A baboon swing on tree branch How do you know it? By its fruits, leaves, bark Over rally its shape

(Appendix F-01, December 12, 2013, AOS)

Excerpt 8-28 shows a trees and baboons game song that emerged in this study. It was brought to our attention by Gono male learner of Deve. The pupils played this game outside the classroom. They sing about the baboons and trees. In playing the game, the lead singer opens the song by pointing to a particular tree in the bush (stanza 1) within the school locality. When the peer leader calls, the other group members responds by naming it. He or she is knocked out of the game for a duration of one cycle if he or she gives a wrong answer. Others join in the singing. Series of questions are asked in chronological stanzas that follow.

The order of questioning, as shown above, includes medicinal use (stanza 2), how used (stanza 3), source of knowledge (stanza 4), place of habitation (stanza 5) and characteristics

(stanza 6). Indigenous content that can be taught in science lessons can be drawn from the song as a whole and each of its stanzas. It can be inferred from Excerpt 8-26 above that the oral forms of knowledge are not only a source of content to be taught, but also access tools to knowledge. In addition, various pedagogical approaches can be drawn from this game song as tabulated in 8-4 below. These illustrate various forms of pedagogy inclusive of dialogues, observations, co-operation and doing/hands-on. This pedagogical aspect also shows that oral forms of knowledge are also pedagogical tools for the teaching of Tsime knowledge.

Table 8-4: Implied content and pedagogical aspects

Stanza	Emerging content	Pedagogical aspect
0	Baboons and trees	Oral pedagogy
1	Naming trees	Observation
2	Tree and ailment connections	Conversing/dialogue
3	Medicinal uses of the tree	Doing/conversing
4	Interdependence	Working with others
5	Plant habitat	Observation
6	Identification of trees	Observation

Stanza 0 refers to the entire song. The oral form being both game and a probing song that implies group work because this game is played by groups. No game can be played alone and a question asked requires a response from another person. Grouping, for the benefit of all, is an underlying assumption of *Unhu.* This group approach in doing things and learning themes, suggested in stanza 4, teaches collaboration in knowledge making. It is also pupil centred as suggested by the syllabus in Excerpt 7-12 (p. 225) in Chapter Seven. The fact that the song-game is organised and played by peers also reveals the importance of collegial relationships in learning, transferring the responsibility of learning and even teaching each other to the learners.

The game is played outside the classroom as inferred from the pointing at trees in the natural vegetation. It encourages each child of that locality to be well versed in tree nomenclature in the community (stanza 1). Interpreting this assumption in relation to the questioning approach of the game suggests an inquiry approach to knowledge gaining. According to Augare and Sawyer (2011), “inquiry is the basis of indigenous knowledge just as it is in science”. The

song shows that inquiry is evident in assumed observations. This claim is supported by the finding that some indigenous people learn about healing plants from nature such as the fighting snakes and plants used by baboons (see Chapter Six, section 6.7). Similarly, the playing of the baboon in a particular tree may have informed the composers of the song about the tree's medicinal value (stanza 2). Such observations, including the behaviour of the tree that is used as identifier, cannot be done inside the laboratory but rather in fieldwork activities (stanza 1, 5 and 6).

The game song also shows two aspects that motivate one to learn more about trees and their healing properties. The first is the punishment and reward based reinforcement, which is practised through ousting and remaining in the game respectively. The second is omissions or lack of detail that creates knowledge gaps needing to be filled. Such a gap can be identified between the tree parts used and how they are used. This is how the parts are collected and the conditions for their collection, if any, are given. To fill in this gap, teachers can turn to the other people identified as knowledge holders in response to the question: how did you know? These are Elders and healers. The Elders would assist in the teaching of Tsime knowledge as cultural consultants. This creates opportunities to seek Elders' and healers' expertise and wisdom through appropriate cultural protocols and methods. Doing this implies exploiting the extension of classroom activities to community people as indicated in section 7.3 (p. 246). One method is to encourage fables and male *matare* (meetings). In such groupings, which the pupils revealed were still taking place, spaces for probing and asking questions are created. So pupils can be taught how to take advantage of such situations and ask questions related to what they are learning in schools. The learners' findings can be followed up in the classroom through discussions and report-backs.

8.4.3.2 **Spiral lesson sequencing**

Four stages were evident from stories of becoming healers and practising healing I discussed in section 6.3.2 (p. 223). These phases, including imaging, verbalisation, practicalisation, and doing, closely mirrored my own learning journey in this research. My research phases, as I have discussed in Chapter Five, progressed from negotiation, talk, doing and showing. Table 8-5 below depicts the pedagogical sequencing I drew from the resemblances of becoming a healer and learning from healers.

Table 8-5: Pedagogical sequencing drawn from healers

Becoming a healer	Learning from healers	Pedagogical sequencing
Imaging	Negotiation	Introduction
Verbalisation	Talk	Dialogue
Practicalisation	Doing	Fieldwork/demonstration
Doing	Showing	Hands-on/ fieldwork

Though Table 8-5 above is projecting a linear progression of the phases, this is more of organisational convenience than reality. In a practical sense, the journeys more closely reflected a circular or iterative movement where, after gaining some knowledge, one becomes eager to know more, given enough time for self-introspection and reflection and escalated forward or backwards to reveal a spiral progression. Collating the last variant phases represented the three stages of learning or teaching: to motivate, to dialogue, and to do. These phases can be adopted within a single lesson or in series of consecutive lessons. I interpreted the motivation phase from the imaging and negotiation as introductory. The motivation comes from disequilibrating the pupil's mental stability. For instance, the images of the knowledge custodian (teacher) and the plant (subject or content) without talk might be interpreted as having left it to the healer to search for their meanings. The second involves dialogue where answers are given. This leads to the third phase of doing or fieldwork. The circle repeats itself backwards or forwards. I do not claim that these phases are unique to indigenous learning. However, I suggest that this model is an important foundation for culturally fitting pedagogies grounded in indigenous oral knowledge transmission into the classroom. Other oral pedagogies can therefore be adopted in line with this sequencing to be commensurate with the experiential indigenous learning styles. This is illustrated in the ensuing section in which I illustrate how some Tsime knowledge aspects can be integrated into the ZJC syllabus.

8.5 Integrative classroom science: A case of community health

There are many possible examples which can be drawn from the findings of this study to show what integrative classroom science could look like in actual lessons. I focus on the syllabus H, Health, for illustrations. The lesson case is drawn from the community health unit

scheme (Table 8-6) and teaching unit map (Figure 8-4) below.

Unit H in the ZJC syllabus focuses on health and is titled “Health”. For possible integration, this unit can be revised and re-titled “Community Health” (Table 7-3, p. 263). Table 8-6 above shows five content areas of this community health topic selected from the Tsime (Chapter Six). My structuring of the Tsime into the Junior Certificate science syllabus has been based on two main assumptions drawn from the above discussions. The first is that the integration is driven from parallel modes. Secondly, the teacher has autonomy to restructure the syllabus in accordance with local contexts and new curriculum demands (see Excerpt 7-13, p. 273).

Guided by these assumptions, Tsime knowledge has been placed in the ZJC syllabus. Table 8-6 below shows this integrative structure. I leave out the objectives and notes columns for the lesson planning. The content column is subdivided into two to show the possible side-by-side existence of the western science content and the Tsime drawn content.

Table 8-6: Community health syllabus structure

TOPIC	**CONTENT**	
	ZJC syllabus	**Tsime**
1. Wellness and ill health Meaning of health	• Physical, mental and social state of being wellbeing, not just an absence of disease	• Absence of invasions including physical and spiritual
2. Child health 2.1 Antenatal care 2.2 Immunisations and vaccinations 2.3 Diarrhoea	• Antenatal clinical visits • Breast feeding • The six killer diseases immunisation schedule on the “Road to Health” card • Hygiene and cleanliness • Oral rehydration - the need to replace fluids lost during diarrhoea. • Preparation of oral Rehydration Solution.	• Home based care that includes uses of local plants and spiritual related care • Breast feeding and spirit related care • Fontanel, *Ruzoka*, *buka* protections and cultural birth protocols • Type of diarrhoea symptom related remedies, e.g. *nhirere*, fontanel, teething, hygiene and cleanliness
3. Diseases 3.1 Mental illnesses* 3.2 Bilharzia 3.4 Malaria 3.5 Wounds* 3.6 Burns* 3.7 Snake bites*	• Physical causes: - Pathogens - chemicals and poisons, - poor nutrition, - genetic defects • Life style measures • Clinical treatment	• Three categories: - Natural - Spirits - Witchcraft - Exorcism depending on foreseen causes • Indigenous defined life style • **Healing plants**
4. Sexuality and health 4.1 Sexually transmitted diseases	• Incurability and spread of HIV-AIDS	• Exorcism depending on foreseen causes

STDs HIV-AIDS 4.2 Infertility* and contraception 4.3 Libido* High Low 4.4 Menstrual related problems Dysmenorrhea* Menorrhagia* Amenorrhea (slowed or stopped menstruation)*	• Abstinence as the safest method of preventing personal infection. • Sexual behaviour causes • Clinical treatments • Life style preventive measures	• **Use of healing plants** • Indigenous defined life style
5. Growing up	• Male secondary sexual characteristics ~ Pubic hair, ~ Beard growth ~ Broadening of the shoulders ~ deepening of voice ~ Wet dreams • Female secondary sexual characteristics ~ Pubic hair ~ Development of breasts ~ Widening of hips ~ Onset of menstruation	• Sex and Sexuality • **Local uses of plants** • Some adulthood socio-cultural preparations ~ labia majora shaping and protrusions ~ Breast enlargements ~ penis enlargements

I select the common disease sub-topic as representative of integrative teaching and learning of plant healing. The content marked with an *asterisk* (*) is not explicitly specified in the current syllabus but is suggested from the Tsime content. However, as shown in the above structure, these could also be taught from a western medicine perspective. My inclusion of these topics is based on the emphasis of the participants and prevalence in the community. Their inclusion therefore addresses the issue of relevance to the community and the pupils. From the suggestion put forward by the participants and my own professional background, I interpret the disease learning area and concept map, its teaching, from a Tsime perspective as shown in Figure 8-4 below.

8.5.1 Mapping plant healing teaching: A focus on diseases

The following Figure 8-4 suggests that teaching of Tsime knowledge proceeds from a defined pathway model. In this study, data relating to syllabus placement of Tsime knowledge suggests the parallel co-existence (see section 8.3.2 above). Simply put, this model suggests that both common and different aspects need to be taught from both perspectives in ways that promote their visibility and co-existence.

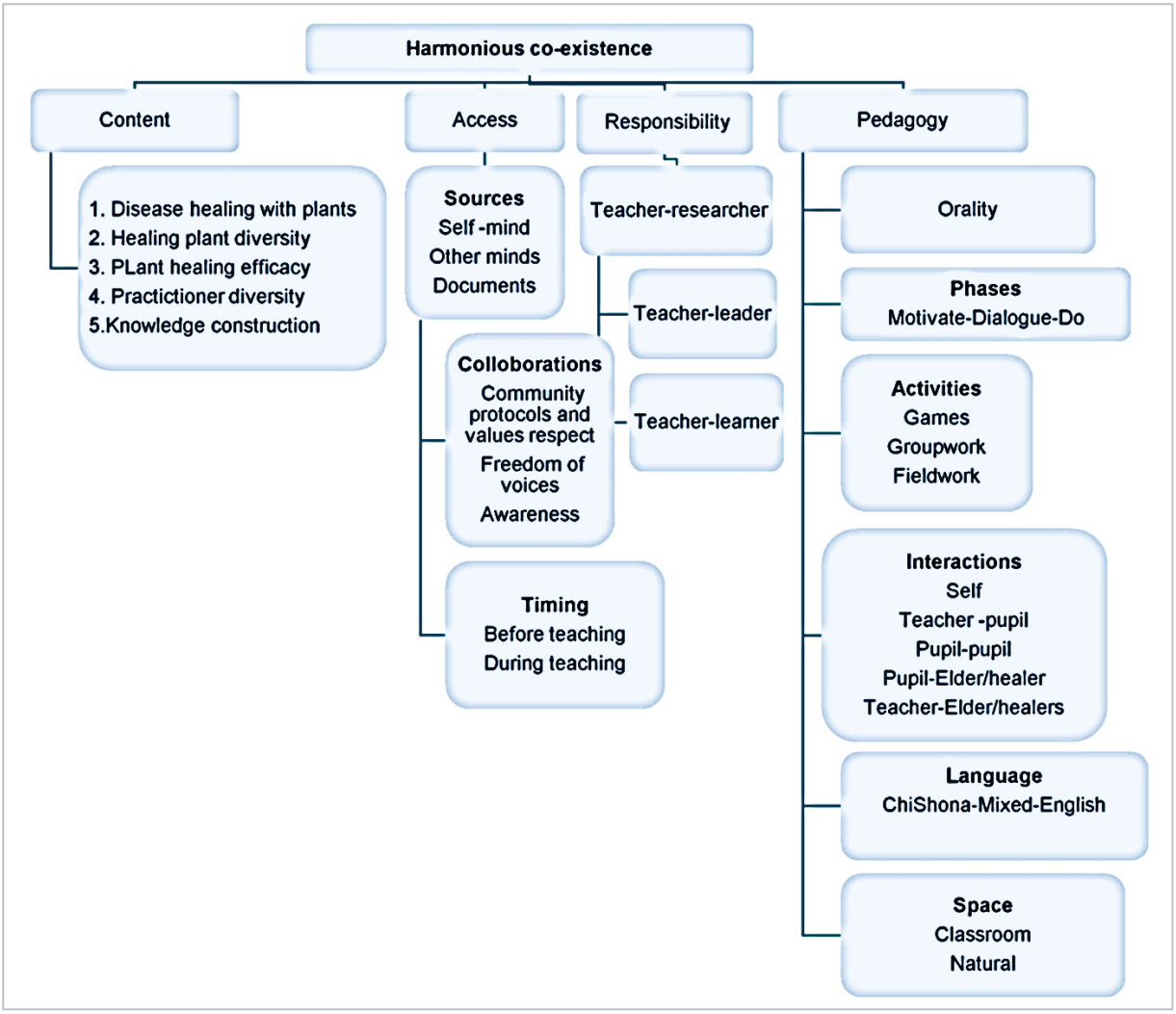


Figure 8-4: Plant healing teaching map

Lesson topics are drawn from the content dialogue box and guides teachers on what content they could teach in the classroom science. The main topic to be taught, healing plants, is highlighted and drawn from the integrative scheme (Table 8-6). As the integrative scheme shows, every health topic taught is linked to healing plants. This is because of the across wheel of life uses of the plant in managing health in a community (see section 6.6, p. 235).

As suggested by this concept map, the identification of the sub-content area or lesson topic(s) needs to be followed by issues of how to access the aspects of this knowledge for teaching. The downward arrows from the access dialogue box are guiding teachers to identify sources of knowledge from which to collaboratively access Tsime knowledge for documenting prior to teaching or during teaching. According to this study, collaboration entails respect of community values and protocols, driving access from the participants' informed position and emic perspective. Even if the knowledge is documented prior to teaching, like in the case of

Tsime, documenting this knowledge comes with some losses, therefore teachers need to continuously access this content for elaborations during their teaching.

The study makes it apparent that the responsibility of implementing the indigenous knowledge integration into the curriculum policy lies with the teachers. Hence, these teachers are advised to take the access initiatives. In doing so, as suggested by the cascading arrows from the responsibilities dialogues, this task suggests that they multi-role that starts with their understanding of themselves as teacher-researchers. In this capacity, a teacher is able to alternate roles as leader and learner in both the classroom and community depending on the situation as discussed in section 8.2.2.2 (p.302) and in Chapter Seven (section 7.2, p.243).

As researcher, the teacher might be able to establish indigenous pedagogies suitable for his or her local context. Teaching Tsime content seems to be commensurate with oral pedagogies (see section 8.4.3 above). These pedagogies tend to suggest careful selection of lesson sequencing, planning for different types of interactions and commensurate activities (Chapter Seven). The teacher is also expected to take into consideration the pedagogical context. Above all, the language of instruction emerges as central across all the themes which the teachers need to consider in the teaching of this Tsime knowledge (section 8.4.1, p.319 and 7.6, p.264).

8.5.2 Treatments for wounds

The treatment of wounds topic is used as an exemplar for planning about integrative lessons. It draws from the concept map above and other findings of Chapters Six and Seven. I divide this section into two parts, theoretical background and classroom practices. The theoretical background component focuses on the teaching aspects that inform the actual lesson development. It is built from teaching assumptions, content to be taught, learning purposes and possible challenges. The classroom practice aspects are pedagogical in focus and are aimed at illustrating the development of the lesson. The aspects of sequencing, teaching approaches, activities and interactions, language of instruction and teaching context are illustrated under this classroom practice component.

8.5.2.1 Theoretical background

This summarises the theoretical knowledge imperative for the teaching of Tsime knowledge from an integrated syllabus. These theoretical bases are drawn from the findings of the previous chapters.

Assumptions

The dialogic findings of Chapter Seven suggest a comparative approach to the teaching of an integrative syllabus. This means Tsime content is placed in a topic that presents the opportunity for teaching it. Such phenomena, like the treatment of wounds, can be taught from both a Tsime and western medicine perspective. Two alternative assumptions of teaching a topic from both perspectives emerged in Chapter Seven. One is the continuity and accommodation that aims at broadening the pupils' cultural knowledge acquired through life in the community with the western science alternative understanding of the same phenomenon. For example, understanding the treatment for open wounds from plant healing and clinical treatment perspectives. Such an assumption moves the teaching from the indigenous frame to the western science frame (see section 7.7, p. 264). For the same reason but with a converse approach, is reclaiming culture and cultural knowledge identities. This acknowledges the previous dominant position of western science in the syllabus. Yet another assumption is that pupils hold some substantial knowledge of the lesson topic; that means some of them can teach their peers and the teachers as suggested in the Chapter Seven.

Content and time allocations

The specific indigenous content of such a topic exists in the community. Its western science content is well documented in the literature that includes textbooks, internet resources and publications, as documented in Chapter Six. The following indigenous content is from Chapter Six. The lessons are planned with the science lesson curriculum time allocated in mind. As discussed in Chapters Three and Seven, six periods are allocated to science per week. In both schools, each period is thirty-five minutes long. The periods are time-tabled in doubles to give three doubles per week of 1hr 10 minutes. We can assume that each of the following topics can be taught in one double period.

Lesson 1: Wound types

These are identified by their local names. The nomenclature, as revealed in Chapter Six, describes the characteristics of the wound. For example, *pfuke-pfuke* is a wound type that appears and disappears, only to resurface on another spot after some time. The participants classify the wound under the genre they define as *mhuka* (cancers). This shows that the body has been invaded by an animal, particularly a mole. It is clear from these connections that one way of constructing knowledge in the community of Tendera is through observations of real

life events, as the following names of diseases show

- *Pfuke-pfuke* (disappear-reappear)
- *Jinda* (strong and stubborn)
- *Rutsva* (burns or scalds**)**
- *Kukuvara* (injuries)

This lesson can be followed up by the plants used to heal such wounds.

Lesson 2: Healing wounds with local plants

In Chapter Six, the nine plant species are recorded in local name as sources of wound plant indomedicine (Appendix I). These are listed below. The local names of the plants in bold are pseudo and their botanical identities are withheld because they are recorded for the first time.

- ***Chimbambaira*** name withheld
- *Gavakava* *Aloe excelsa A. Berger*
- *Mubvamaropa* *Pterocarpus angolensis DC*
- ***Kabaya*** name with-held
- *Munannzwa* *PouzolziahypoleucaWedd*
- *Murima* *Daigeria nitidula Welw.Ex Baker*
- ***Murukanyama*** name withheld
- *Mushamba* *Lannea discolour (Sond) Engl*
- *Musososti* *Flueggeavirosa -Roxb.exWilld*
- *Mutiti* *Erythrina abyssinicaLam. exDC*

The learning about these local plants used for healing wounds need not just be construed as listing them and what they treat. Rather the findings of Chapter Six show another content focus area that includes Plant and wound mimicry relationships, cultural and natural medicinal efficacy and how these plants are used for prevention and treatment. These content areas, as demanded by the holistic and complex nature of Tsime knowledge, have to be taught from the indigenous conception of the causes of wounds. Thus, this topic lesson can be followed up by lesson two as structured below.

Lesson 3: Causes of wounds

Lesson 4: Plant wound mimicry relationships

Lesson 5: Prevention and treatment of wounds

Lesson 6: Cultural and natural medicinal efficacy of plants

Purposes

The purpose section in Chapter Seven has clearly shown that integrative teaching needs to build toward the attainment of immediate participation objective (s) and connect to long-term curriculum goals. The main long-term curriculum goals, as revealed in Chapter Seven, are that the products of the school system need to be academically prepared and competent in both western science and indigenous knowledge so that they can contribute to their nations and the world at adulthood. The classroom participation goal is to promote and instil both indigenist and westernist science knowledge in the classroom in preparation for future participation in academic work and societal fields. The teacher is then expected to formulate the lesson objectives in line with the immediate objectives and long-term endeavours. The following examples of objectives are formulated for lesson two.

By the end of the lesson, pupils should be able to:

- Name some local healing plants for wounds.
- Identify these plants from the local flora.
- Describe the plant behaviour patterns linked to wound treatment.
- Describe the differences and similarities of the above content areas between indigenist and westernist approaches.

8.5.2.2 Classroom practice

The main focus of classroom practice is pedagogy (Chapter Seven). Indigenous knowledge and science education researchers offer several ideas on teaching integrated science that are in line with the pedagogy of cultural border crossing. The continuity and accommodation type of border crossing that emerged in Chapter Seven suggests the movement from the Tsime framework to the western science framework. Oral pedagogical approaches that include sequencing and tuition, as demonstrated above, can be used. The sequence, motivate-dialogue-doing need not be construed as prescription but pedagogical aspects to focus on. For instance, the teacher can adopt the game pedagogy to stimulate interest in the subject as described above. Another example is that the teacher can introduce the lesson by pictures of the different types of wounds. The motivating aspect is to stimulate learning through various activities. The dialogue aspect emphasises conversational pedagogical approaches to instruction and access to knowledge from self and others. These include different activities like discussing the contents of songs, stories and other oral forms. The doing is a hands-on

approach aligned to fieldwork. The teacher can stimulate his or her learners into realising and exploiting their indigenous research inheritances. For example, boys can explore the plant healing learnt during activities such as evening *matare* (male meetings) and herding of cattle. Similarly, girls can do the same during activities such as firewood gathering and fable sessions.

8.6 In conclusion

Evident in this chapter are various views on the notion of integration, the content to teach, pathway frameworks and pedagogical approaches. Such diversity far exceeds the simple policy assumptions that teachers without research grounded framework would be able to undertake this complex curriculum reform. Teachers need to be initiated into research for them to be able to handle all complicated tasks of integration. The classroom examples given prior to this conclusion inform that the integration of Tsime knowledge into classroom science extends beyond teachers' prescriptive interpretations of curriculum documents. Rather, it envisions the teachers becoming equipollent in their teaching through community and/or classroom collaborations that are rooted in indigenous cultural frameworks. Such integration has the potential to enable learners in Tendera to develop further their cultural knowledges and at the same time becoming more receptive of western science.

9 CHAPTER NINE: LOOKING BACK

9.0 Introduction

This chapter concludes the exploration of the possibilities of integrating indigenous knowledge into classroom science using the case of plant healing at Junior Certificate level in Zimbabwe. The study commenced in Chapter One with a complexity argument. That is, the teachers' failing to integrate indigenous knowledge into their science teaching in Zimbabwe and elsewhere. This is not necessarily indicative of their lack of such spirit, but, rather, could imply that this reform is too complex for them to tackle. Literature indicated that the policy directive to integrate indigenous knowledge into classroom science has failed to materialise in Zimbabwe for over three decades. Because teachers lacked documented resources, in terms of both content and pedagogy, this problem, I argued, would continue if these teachers were not abetted by researchers like me to tackle such a complex responsibility. I set a task to document the indigenous knowledge of plant healing in the community of Tendera and to illustrate how this could be taught in science classrooms in an effort to contribute towards the solving of this problem. Through the guidance of the Culturally Aligning Classroom Science (CACS) model, I adopted an Indigenous African Interpretive (IAI) methodology in pursuance of these self-set objectives.

This chapter highlights the IAI methodological findings of the study and presents the integrative classroom science (ICS) process model that transformed from the CACS model. This emerging integrative classroom science process model summarises the study. Findings highlighted relate to each research question within the discussion of this emerging model and show how these objectives have been achieved. Notable contributions to new knowledge and recommendations as well as limitations, where they exist, will be pointed out within these discussions. I then reflect on the lessons I have drawn from undertaking this study and highlight the challenges to integrating indigenous knowledge of plant healing into the secondary school science curriculum that emerged from this study. The final thoughts I give conclude this chapter.

9.1 The IAI methodological findings

This research was driven by two main questions, re-stated as follows:

1) What accessible indigenous knowledge of plant healing do participants of Tendera hold?
2) How can this knowledge be taught in science lessons at Junior Certificate level in Zimbabwe?

These questions focused this study on the integration phenomena of the two knowledge bodies, indigenous knowledge and western science as respectively represented by indigenous knowledge of plant healing (Tsime knowledge) and ZJC classroom science. The cultural differences between the Tsime knowledge and ZJC westernised classroom science informed my pursuance of the practicality of moving Tsime knowledge into classroom science through a self-developed IAI methodology. Thus, my objective of exploring this integration phenomenon through a culturally sensitive research methodology (Objective 3, section 1.4, p. 11) was pursued. As reported in Chapter Four, I developed this methodology, which subsequently guided my fieldwork as discussed in Chapter Five. I am inclined to believe that this IAI methodology is a new way of doing integrative classroom science research, and, therefore, a notable contribution to the field of research methodology in indigenous knowledge and science education.

This methodology illustrates the importance of combining western and indigenous methodologies in researching problems that involve indigenous knowledge and western science. In contemporary times, when cultures are in flux, indigenous scholars have not documented African research methodologies, more so when they combine with western interpretive approaches. This makes the idea of adopting such methodologies unthinkable, particularly by novice researchers in pursuance of a Doctor of Philosophy. As such, this research may have suffered from my status as a research novice in this respect. To minimise this limitation, I read widely the literature on indigenous methodologies, presented my ideas to experienced researchers through publications, conference presentations, Southern African Association for Research in Mathematics, Science and Technology Education research school consultations and critical readership of my mentor, Professor Alexio of the University of Zimbabwe, and my peers. In this regard, I documented one such African research methodology that I used for this study and that could be taken up by other researchers as possible area for further investigation. I see the potential in it to influence the way future research that involves indigenous knowledge, particularly research on plant use for healing,

and western-oriented classroom science is conducted.

The totemic methodology, whose tenets were implemented in this study as they emerged, strongly facilitated my access to some of the Tsime knowledge deeply rooted in the secretive and sacred zones of the participants. Many times, participants surprised themselves by revealing this knowledge to me and the way I was provided with this knowledge by others, particularly by the great spirits of the land. The continuous access to participants with data generation from beginning to end offers another way in which other researchers may consider taking up research of this nature. This methodology also challenged the issue of conforming to university ethical standards of doing research based on western ethical research frameworks for researching with indigenous people who hold high regard for their spiritual guidance and whose traditions of relating is basically oral. For example, the issue of written consent needed to be complemented with that of verbal consent valued by the indigenous people of Tendera. The sense of verbal consent emerged to be informed, confirmed and verbal through spiritual clearance (Mpofu, Mushayikwa, et al., 2014a). I look forward to continuing the research and publishing it to create a forum of academic discourse. Some areas for further research that this methodology has evoked include: (1) African Indigenous paradigms; (2) Totemic worldviews and methodologies; (3) Indigenous methodologies; (4) Community access with data generation; and (5) Indigenous ethical frames of research.

9.2 The emerging ICS process model

My overall goal in this thesis was to explore how indigenous knowledge could be integrated into the science classroom using the case of indigenous knowledge of plant healing at ZJC level in Zimbabwe. I pursued this research objective through two main objectives corresponding to the two research questions re-stated above. These are:

1) to document the indigenous knowledge of plant healing existing in the community of Tendera as shared by the participants;
2) to illustrate how this knowledge could be taught within the Zimbabwe Junior Certificate science syllabus from the participants' voices.

Figure 9-1 visualises and summarises the research process I engaged in to attain these objectives. It is a transformation of a CACS research tool (Figure 2-1, p.27) that informed my research process upon its commencement (see section 2.2.2, p. 29).

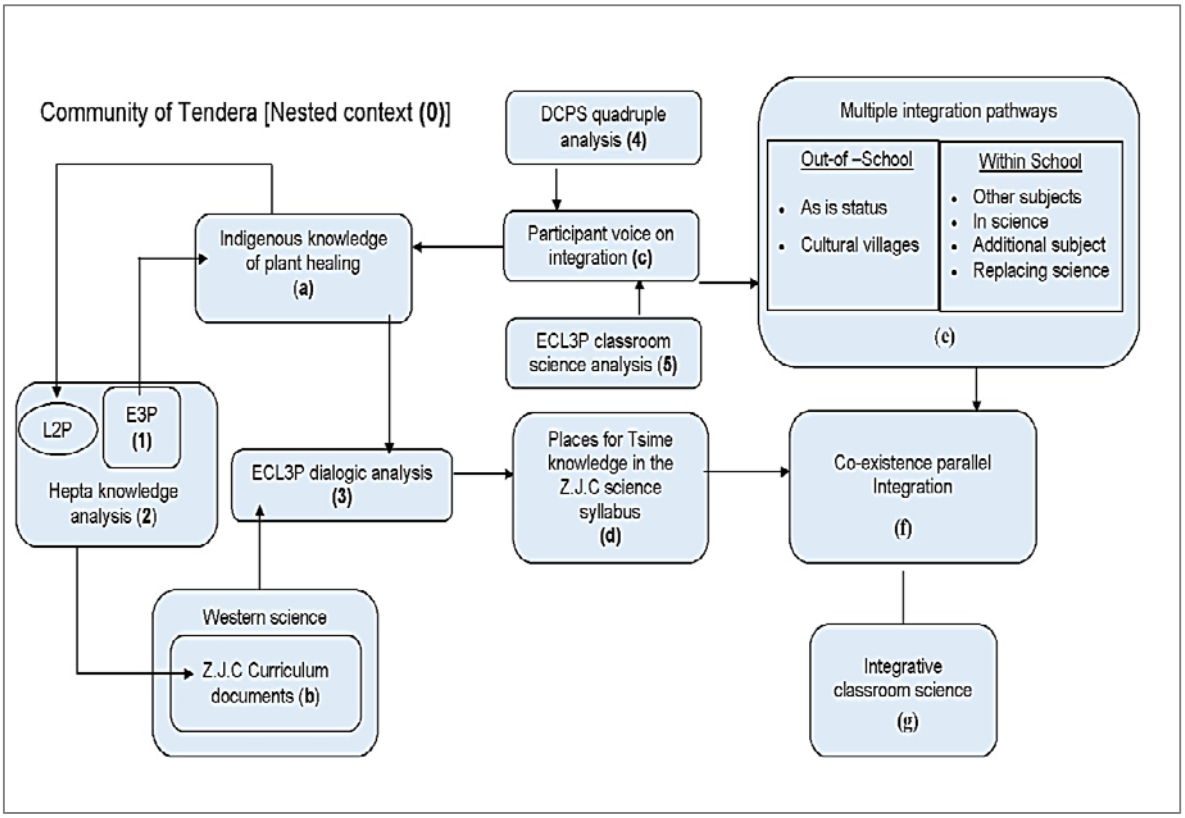


Figure 9-1: ICS process model

The findings answering the research questions modified some of the components of the CACS model into the ICS process model shown in Figure 9-1 above. To understand this model, it is important to remember that the E3P represents the knowledge dimensions of enterprise, paradigm, process, and product. The L2P notation depicts the additional knowledge dimensions of language, place and pedagogy that emerged from the data. The E3P and L2P combined into an EL5P (hepta) knowledge frame. The DPCS of the quadruple model relates to integration forms of divergent, convergent, parallel and substitutive. ECL3P depicts the classroom science dimensions of enterprise, content, and language of instruction, place, pedagogy and purpose. It was named the holistic classroom model. The transformation of the E3P knowledge model expanded the PCP (purpose, content and pedagogy) classroom science frame to this holistic classroom science model. The numbers (1) to (5) depict analytical models and that of (a) to (g) represent process outcomes. Numbering in this integrative classroom science process model has been done for easy referencing in the discussions that follow.

9.2.1 The community of Tendera

The community of Tendera specify the context dimension zero (0) of the CACS. CACS defined integration is context-specific in relation to the locale or place-based nature of indigenous knowledge (Aikenhead & Ogawa, 2007; Shizha, 2007). The knowledge plurality feature of indigenous knowledge, therefore, means indigenous knowledge varies from community to community (Aikenhead & Michell, 2011). This modifies the knowledge dimension of CACS to imply that knowledge pluralism not only relates to the existence of western science and indigenous knowledge, but within indigenous knowledge systems as well. This indigenous knowledge plurality restricts the documented Tsime knowledge and the integrative classroom science findings from this study to the community of Tendera. The Tendera Community Context was provided for in Chapter Three.

Findings of this study, therefore, should be interpreted as not generalisable beyond the community of Tendera, but, rather, as insightful on how the problematic integrative classroom science reform could be tackled at the broader level of Zimbabwe and beyond. The findings are transferable to other contexts in as far as the subjective interpretations of the readers are informed by the characteristics of the community of Tendera which can be drawn from the context Chapter Three, methodology and methods, Chapters Four and Five, and findings documented in Chapter Six. In sum, the community of Tendera emerged as: (1) a rural place of habitation and healing with plants; (2) a holistic community consisting of the physical and spiritual community and whose physical community embodies spiritual, human and non-human membership; (3) a reservoir (Tsime) of IKoPH; and (4) habiting indigenous Zimbabweans of the Zezuru Shona ethnic group. The participants showed that, despite colonialism and modernisation, the people of Tendera have retained their Zezuru ways of managing health alongside those of western medicine. The majority of the people of Tendera emerged to be dual consumers of indigenous and western medical services.

In Zimbabwe, all schools teach from the same syllabus designed at national level, making the implementation of the integration findings of this study, which are summarised in following sections, a very difficult task. This is because the community specificity of these study findings confines teachers to one locality. Teacher transfers to other schools in different communities might mean the need to access knowledge related to that community and implementing integration according to the dictates of the members of that community. This is because Zimbabwe is ethnically diverse (see Table 3-1, p. 83). As such, implementing

integrative classroom science reforms remains practically problematic. This points to a need to prepare thoroughly for integrative classroom science prior to classroom practices.

More studies of this nature then are needed in other parts of Zimbabwe with a variety of ethnic groups; for example, the Karanga of Masvingo, the Korekore of Mashonaland Central, the Ndebele of Matabeleland, and the Ndau of Manicaland, among others (see Table 3-1). In addition, differences in practices and beliefs between rural and urban communities need to be ascertained as policy issues cut across all societies in Zimbabwe. Teachers would benefit if such activities would be merged and launched in local communities. Further research involving larger groups of participation categories of stakeholders, for example healers, teachers, learners, Elders and policy makers is therefore needed. Above all, the Ministry of Education needs to tap from such studies and enter the documented IKoPH and its teaching strategies into a database of various forms of indigenous knowledge from different communities for classroom practices. To do this, the Ministry of Education needs to draw lessons from similar projects conducted elsewhere, like the Alaska Native Knowledge Networks (Barnhardt, 2013). These would serve as teaching resources and curb the limited documentation of IKoPH and pedagogical frames problems. I am aware of the Science, Technology and Innovation policy's mandates of documenting indigenous knowledge and developing "courses on IKS that are suitable for inclusion in the school curricula" (Science, Technology and Innovation, 2012, p. 11). But this needs to be done within the relevant Ministry of Education.

My study made it apparent that the community of Tendera is part of a whole that is nested within the district, provincial, national and international communities. It further showed that the IKoPH in this community is held by all its members, spirits, human and non-humans. But the fieldwork process of this study showed that researchers could only access this knowledge by interacting with its human elements who have tapped this knowledge from their non-human co-habitants and have abilities to access this form of knowledge from their spiritual community. The study showed then that accessing this knowledge involves the negotiation of physical, human and knowledge fields (Chapters Four and Five). This finding added a nested field theoretical perspective of community (Figure 3-1, p. 81) for accessing IKoPH from the community of Tendera. Thus within the ICS process model, integration context needs to be understood from the nesting of the physical, human and knowledge aspects of the community participating in the community.

9.2.2 IKoPH in the community of Tendera

The E3P knowledge model of CACS is identified in Figure 9-1 above with the number (1). This model presumed that IKoPH in the community of Tendera would emerge in four dimensions of practitioners (enterprise), their worldviews (paradigm), their methods of knowledge production (processes) and knowledge outcome (product). However, the initial E3P analysis of IKoPH data revealed three more dimensions of language, transfer of knowledge (pedagogy) and place of operation, the L2P (section 5.7.1.3, p. 184) and expanded the knowledge characterisation to the seven (hepta) features, which are labelled (2) in the ICS process model (Figure 9-1). The re-examination of IKoPH identified as aspect (a) using the hepta knowledge tool (aspect 2), revealed the Tsime knowledge documented in Chapter Six. The findings documented in Chapter Six answer the first research question: What accessible IKoPH do participants hold? The documented Tsime knowledge in Chapter Six resembles, as much as possible, its holistic existence in the community.

As shown in the literature review in Chapter Two, many indigenous medicine studies that have been conducted in other fields, such as ethnobotany, ethnomedicine, ethnography and pharmacology studies, have only documented the physical plants of natural medicinal value found in indigenous communities. Such recordings, as this study has shown, represent IKoPH in a very narrow way. Furthermore, very little documentation has been done in the field of science education with a particular focus on building a Tsime resource for classroom science. I believe that this study, by holistically documenting IKoPH into a Tsime resource for classroom practice, has contributed to the fields of indigenous knowledge and classroom science fields. This documentation has shown that Tsime knowledge is a highly complex body of knowledge. I, therefore, suggest further explorations to reveal more about several of its aspects that include indigenous language of IKoPH, healing across the wheel of life, spiritualism, and intellectual property rights, among others. Actually, Intellectual Property Rights, as a western concept used in indigenous knowledge, is another level of integration of indigenous knowledge and western science that may need to be pursued further.

Whilst it is imperative to document Tsime knowledge for classroom science, we need to note that this kind of knowledge is subject to possible exploitation for economic gains. In this regard, Otulaja et al. (2011, p. 698) hint that

> a recent resurgence of interest in indigenous knowledge … is mainly centred on those aspects … of economic value to the Western world, namely herbal, medicinal and agricultural knowledge and practices, all which are vulnerable to exploitation.

This points towards the need to preserve and protect IKoPH through upholding intellectual property rights.

9.2.3 How IKoPH could be taught

In Chapter Seven, IKoPH (aspect a) and the ZJC westernised science (aspect b) were holistic classroom model based dialogically examined (aspect 3). This analysis revealed Tsime knowledge integrative opportunities in the ZJC syllabus (aspect d). This component (d) of the integrative classroom science process model (Figure 9-1 above) is a modification of the integration phase of the CACS model. The integrative opportunities that emerged showed that the ZJC science curriculum was permeable to integration with Tsime knowledge. Integration emerged as the broadening of each of holistic classroom model westernised classroom aspects with Tsime knowledge aspects in ways that promote their side-by-side co-existence.

The integrative opportunities perspective of integrative classroom science has profound implications for the teacher as a classroom practitioner because it places a heavy responsibility on teachers. This finding concurred with Ogunniyi's (2007) observation that the inclusion of indigenous knowledge into the curriculum places new professional demands on teachers. This instigates change that involves emotional struggle and pain (Tobin, Briscoe, & Holman, 1991). In the first instance, integrative classroom science requires teachers to understand the nature of both IKoPH and western science in the syllabus and how they relate (Mpofu, Otulaja, & Mushayikwa, 2014). In the event that the indigenous knowledge form sought to be integrated has been documented, as in the case of Tsime knowledge, teachers (in-service and pre-service teachers) need to be capacitated with knowledge and skills of document analysis for them to understand its nature as well as that of western classroom science. Such analysis becomes the foundation of a comparative analysis of the two knowledge bodies to indicate to the teacher where to teach aspects of IKoPH, what and how. Where the indigenous knowledge has not been documented, teachers need to be capacitated into teacher researchers. These research skills will enable teachers to work collaboratively with community Elders and experts of the sought after indigenous knowledge to access and document it. The Rekindling Traditions for Aboriginal Students project (Aikenhead, 2002)

demonstrates the teacher researcher effectiveness in documenting and developing indigenous knowledge for classroom science integration.

The quadruple integration model (aspect 4) analyse voices on integration data (aspects c) revealed multiple pathways to integration (aspect e). This analysis effected conceptual changes to the quadruple integration pathways of CACS. Thus, within the emerging integrative classroom science process model, integration takes two forms of co-existence, the dissonant and the harmonious. Accordingly, the pathway which both participant voice (aspect e) and integrative opportunity suggested is appropriate for the context and timing. The parallel or harmonious integration emerged to answer the integration pathway question: How can Tsime knowledge be moved from the community of Tendera into classroom science?

The holistic classroom science model (aspects 5 and 2) analysis of data resulted in the Tsime content (section 8.4.2), the oral pedagogy (section 8.4.3.1) and the spiral lesson sequencing (section 8.4.3.2) in the integrated curriculum (aspect (f)). Such integrative classroom practices were illustrated with the case of community health in section 8.5 (p.327). This answered the content and pedagogical aspect questions: What Tsime content could be taught and how would it be taught? Thus, CACS (Figure 2-1) research tool was transformed into ICS model (Figure 9-1). Ultimately, these changes lead to the answering of this second research question: How can IKoPH be taught? All this was attainable through stakeholder partnership.

This study, therefore, advises that stakeholder partnership is indispensable in integrative classroom science. This suggestion is not new in studies undertaken in indigenous communities, with indigenous people and involving their knowledge. Rather, it is a recurring theme in many integrative classroom science studies conducted in many countries (see Aikenhead, 2002; Barnhardt, 2007; Keane, 2005; Khupe, 2014; Lee et al., 2012). Teacher training institutions (colleges and universities), Curriculum Development Unit of Zimbabwe, Ministry of Education, schools and local communities, like Tendera, therefore, should form integrative science teaching partnerships. Such collaborations need to mandate themselves to activities such as documentation of IKoPH, curriculum revisiting and continuous development of teaching material. Even in the event that all teaching materials have been developed, the overall need for ongoing consultation with local people is indispensable. No doubt, such collaboration needs to be well resourced. This mandates the government of Zimbabwe to provide appropriate levels and types of support for such integrative classroom

science partnerships to achieve its goals. Such partnerships need also to enhance the separate efforts to implementation of integrative classroom science reform policies expected from different stakeholder groups and individuals.

Teacher education institutions may consider putting in place programs or courses that not only develop in teachers the knowledge of subject and pedagogy for integration, but also model how teachers could do it. These institutions also need to place greater emphasis on research courses in order to instil interest in research and develop research skills in teachers. Teachers need to recognise themselves as researchers. In such research capacities, the teachers need to be conscious of multi-roles and commit themselves to collaborative approaches with local people and university academic staff. Such reforms, if properly implemented, promise benefits to both indigenous and non-indigenous people.

9.3 Lessons learnt

As I came to the end of this study, I found myself pondering on what I had learnt from my four years of engaging in this study. Firstly, I got into the study with an underestimation of the sensitivity around the aspect of IKoPH, particularly the spiritual domain, and its integration into classroom science. Many times this caused me heavy criticism and labelling from many members of the science education research communities locally, regionally and internationally. I learnt to persevere and argue my thesis from informed literature debates and emerging evidence from my study. To my satisfaction, these criticisms transformed into balanced academic critiques with the progression of the study. So I learnt that both criticism and critiques are constructive and catalysts to intellectual growth if taken positively.

Secondly, I came into this research with a “dark box” that this research opened up. I had to disclose my healing encounters at family level that I and other siblings had always kept a secret. This was important to convince the readers on my interpretations of certain phenomena or events, and the actions that, under different circumstances, I would otherwise not do. My keeping of family healing background a secret had to do with what we were meant to believe, that indigenous healing was “dirty”, primitive and witchcraft. I reflected on my long secretive box as the manifestation of a colonised mind. Evidenced by the participants’ confessions, I came to the realisation that I was not alone living with such a “dark box”. In fact, I am of the strong conviction that the study liberated me from the bondage of my secretive past as much as it did for other participants.

Thirdly, I was proved wrong in proposing to work with a fixed number of participants. I had read in literature about "purposive" sampling as a selection of potentially rich sources of data. However, I had not understood this definition to go beyond the number of participants in the study. I later on discovered that, with a research study that deals with indigenous knowledge and its holders within their community set-up, where they are all related, a number of participants changed with the progression of study. My incorporation of the key group of participants was out of a realisation that it is almost possible to limit some key players in cultural issues when doing this kind of research. So, in the context of this study, I re-defined purposive sampling to mean, not only a search of potentially rich sources, but also to identify key participants invested with the cultural powers of opening and closing access to cultural knowledge.

The fourth lesson had to do with my underestimating of the task I had set myself to do at the proposal stage of my study. Little did I realise at the start that a research process could be full of twists and turns, which sometimes surprises even the researcher. In all this, I have learnt that a study can assume a life of its own, and, as long as it answers one's initial goals, should not be constricted by the original proposal details. Both the changes and the growing complexity of my study as it progressed forced me to adjust some parts of my proposal, such that, at one time, I felt I would not be able to contain the ever-occurring demands of expanding horizons arising from the data I was working with. By the end of it all, I felt humbled by a realisation of what more I still had to do and learn on the topic under study.

9.4 Challenges to integrative classroom science

This study revealed a number of challenges to integrating indigenous knowledge of plant healing into the secondary school science curriculum that might affect the prospective benefits of integration. In this section, I summarise five major challenges to integrative classroom science that emerged from this study.

First, the complex and sensitive nature of the Tsime knowledge poses challenges to both the teachers' understanding of it and its access for classroom sciences. Access challenges are further compounded by the subject matter's oral, secretive and sacred nature that calls for proper cultural protocols. Secondly, the study further confirmed that a lack of documented resources of IKoPH and knowledge to teach it were also great impediments to integrative classroom science. Thirdly, the community members' disparate views around integration present another serious challenge to integrative classroom science. Without reconciling these

multiple voices to integration, the endeavours of integrative classroom science remain distant. Fourthly, as also noted by Reis and NgA-Fook (2010), the language difference of western science taught in the classrooms and used for instruction to that of indigenous knowledge and that of its communication presents another challenge to integrative classroom science. The legacy of colonial language domination over that of Tsime knowledge is still very strong in the Zimbabwean classrooms. Fifth and lastly, the spectrum of healership that lead to differentiated levels of expertise may be linked to the challenge of authenticity of both the sources of knowledge and the knowledge they provide. Thus, integrating unauthentic knowledge has serious consequences of downgrading this knowledge system. Therefore, these challenges need to be looked into and proactively acted upon for successful integration to take place. Otherwise, indigenous knowledge, particularly Tsime knowledge, will remain colonised.

9.5 Final thoughts

I am inspired by the mushrooming of research in the field of indigenous knowledge and school science. My hope is that in the decades to come, we move further to see indigenous knowledge and western science co-existing harmoniously side-by-side in the classrooms. My wish is that the current curriculum reforms be successful for the benefit of all learners, localities and nations, indigenous or otherwise.

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APPENDICES

Appendix A: Participation

A-01: Record of fieldwork participants and sessions

Identity	Locale	Gender	Group	Role	Sessions			
					2012	2013	2014	Total
Nkomo	Bindura	Male	Key	MLGRUP officer	5 Sept			1
Ndoro	Chiweshe	Female	Key	MLGRUP officer	30 Oct			1
Hwata	Chiweshe	Female	Key	MPSE officer	16 Oct			1
Form 2	Deve	Mixed	Core	Learners		See Appendix F-01		27
Miti	Deve	Male	Core	Assisted healer		03 Dec	21 Mar 03 Apr	3
Shiri	Deve	Male	Core	Individual healer		25 Nov 24 Dec	10 Jan	3
School Leadership Committee	Deve	Mixed	Key	Leaders		10 May	19 Feb	2
Soko	Deve	Female	Core	Assisted healer		13 Nov 25 Nov 24 Nov	12 Feb	4
Suma	Deve	Female	Core	Individual healer		27 Nov 08 Nov	03 Jan 26 Mar	4
Vimbo	Deve	Female	Core	Teacher		02 Oct 16 Oct 26 Dec	30 Jan 20 Feb	5
Deve	Deve	Male	Key	Village head		31 Mar		1
Shava	Deve	Male	Key	Head of village Heads		17 Nov	26 Mar	2
Dzawo	Deve	Male	Key	School head		8 Feb	27 Nov	2
Ruya	Deve	Female	Key	Health practitioner			20 Feb	1
Form 1	Gomo	Female	Core	Learners		See Appendix F-01		27
Kari	Gomo	Male	Core	Individual healer		30 Oct 06 Dec	15 Apr	3

Moyo	Gomo	Male	Core	Individual healer		05 Dec 19 Dec	10 Mar	3
Nzou	Gomo	Male	Core	Individual healer		31 Dec	05 Jan 02 Mar 23 Mar	4
SLC	Gomo	Mixed	Key	Leader		27 Mar	20 Feb	2
Zivo	Gomo	Female	Core	Teacher		19 Sept 26 Sept 26 Dec	11 Feb 10 Mar	5
Gomo	Gomo	Male	Key	Village head		19 Mar		1
Faiti	Gomo	Male	Key	Health		31 Mar		1
Chemu	Gomo	Male	Key	School Head		8 Feb 5 Dec		2
Choto	Harare	Male	Key	MPSE officer	31Jul 03Dec			2
Wamu	Harare	Female	Key	MPSE officer	13 Jul			2
Sanga	Harare	Male	Key	Researcher	03 Aug			1
Zembe	Harare	Male	Key	Researcher	27 Jul 19 Sep			2
Kanya	Harare	Male	Key	ZINATHA	24 Oct			1
Mbiri	Harare	Male	Key	ZINATHA	18 Sep			1
Mbeza	Harare	Male	Key	MPSE officer	27 Jul 03 Aug			2
Ndola	Harare	Male	Key	MPSE officer	03 Dec			1
Tendera Chief's Council	Tender a	Mixed	Key	Leaders		21 Dec	28 Feb 30 Mar	3
Tema	Tender a	Female	Key	Leaders		13 Oct	24 Apr	2
Mute	Gomo	Female	Key	Teacher		21 Nov		1
Mute	Gomo	Female	Key	Teacher		21 Nov		1

Clara	Gomo	Female	Key	learner		23 Oct 21 Nov		2
Kunatsa	Gomo	Male	Key	learner		21 Nov 5 Dec		2
Ndega	Deve	Male	Core	Teacher	Drop out due to vacation leave			
Ndizvo	Gomo	Female	Core	Teacher	Drop out due to transfer			
Luke	Gomo	Male	Core	Learner	Drop out for undisclosed reasons			
Rujeko	Gomo	Female	Core	Leaner	Drop out for undisclosed reasons			
Tanya	Gomo	Female	Core	Learner	Drop out transferred			
Chiedzo	Deve	Female	Core	Learner	Drop out transferred			
Idi	Deve	Female	Core	Learner	Drop out married			
Kutsigira	Tendera	Female	Researcher	Researcher	All			
Rusa	Gomo	Male	Key	Link teacher	All Gomo sessions			
Chima	Deve	Male	Key	Link teacher	All Deve sessions			

A-02 Participating Elders

Tendera Chief Council		Leadership Committees			
		Deve		Gomo	
Name	**Gender**	**Name**	**Gender**	**Name**	**Gender**
1. Chief Tendera	Male	1. Elder Deve	Male	1. Elder Gomo	Male
2. Elder Rise	Male	2. Elder Shava	Male	2. Mr Chemu	Male
3. Elder Jeme	Male	3. Mr Dzawo	Male	3. Mr Ruse	Male
4. Elder Mapiri	Male	4. Mr Chima	Male	4. Mrs Swera	Female
5. Elder Ndoro	Female	5. Mr Ngoro	Male	5. Mr Verani	Male
6. Elder Maswa	Female	6. Elder Zuru	Male	6. Elder Midzi	Male
7. Elder Chokuda	Male	7. Mrs Mbizi	Female	7. Elder Nzira	Male
8. Elder Mufa	Male				
9. Elder Munda	Male				
10. Elder Ponga	Male				
11. Elder Ngwarati	Male				
12. Elder Musara					

A-03: List of learners

Deve School		Gomo School	
Name	**Gender**	**Name**	**Gender**
1. Chiedzo	Female (Transfer)	1. Emure	Female
2. Mandi	Female	2. Luke	Male (Drop out)
3. Maria	Female	3. Tanya	Female (transfer)
4. Cleo	Female	4. Chihera	Female
5. Vari	Female	5. Chioniso	Female
6. Beaula	Female	6. Fiona	Female
7. Tsitsi	Female	7. Ropa	Female
8. Mandi	Female	8. Chipo	Female
9. Idi	Female (drop out)	9. Rumbidzai	Female
10. Tinei	Female	10. Chiedza	Female
11. Lina	Female	11. Rujeko	Female (Drop out)
12. Nyasha	Male		
13. Taka	Female		
14. Nina	Male		
15. Gono	Male		
16. Ishe	Male		
17. Kim	Female		
18. Kein	Male		

Appendix B: Ethics clearance certificate

Wits School of Education

27 St Andrews Road, Parktown, Johannesburg, 2193 Private Bag 3, Wits 2050, South Africa
Tel: +27 11 717-3064 Fax: +27 11 717-3100 E-mail: enquiries@educ.wits.ac.za Website: www.wits.ac.za

Staff Number:
Protocol Number:
2012ECE015

Date: 26-Apr-2012

Dear Vongai Mpofu

Thank you very much for your ethics application. The Ethics Committee in Education of the Faculty of Humanities, acting on behalf of the Senate has considered your application for ethics clearance for your proposal entitled:

Traditional healers' place-based knowledge and teaching practices: Implications and possibilities of the inquiry-based science classrooms

The committee recently met and I am pleased to inform you that clearance was granted. The committee was delighted about the ways in which you have taken care of and given consideration to the ethical dimensions of your research project.

Please use the above protocol number in all correspondence to the relevant research parties (schools, parents, learners etc.). All the best with your research project.

Yours sincerely

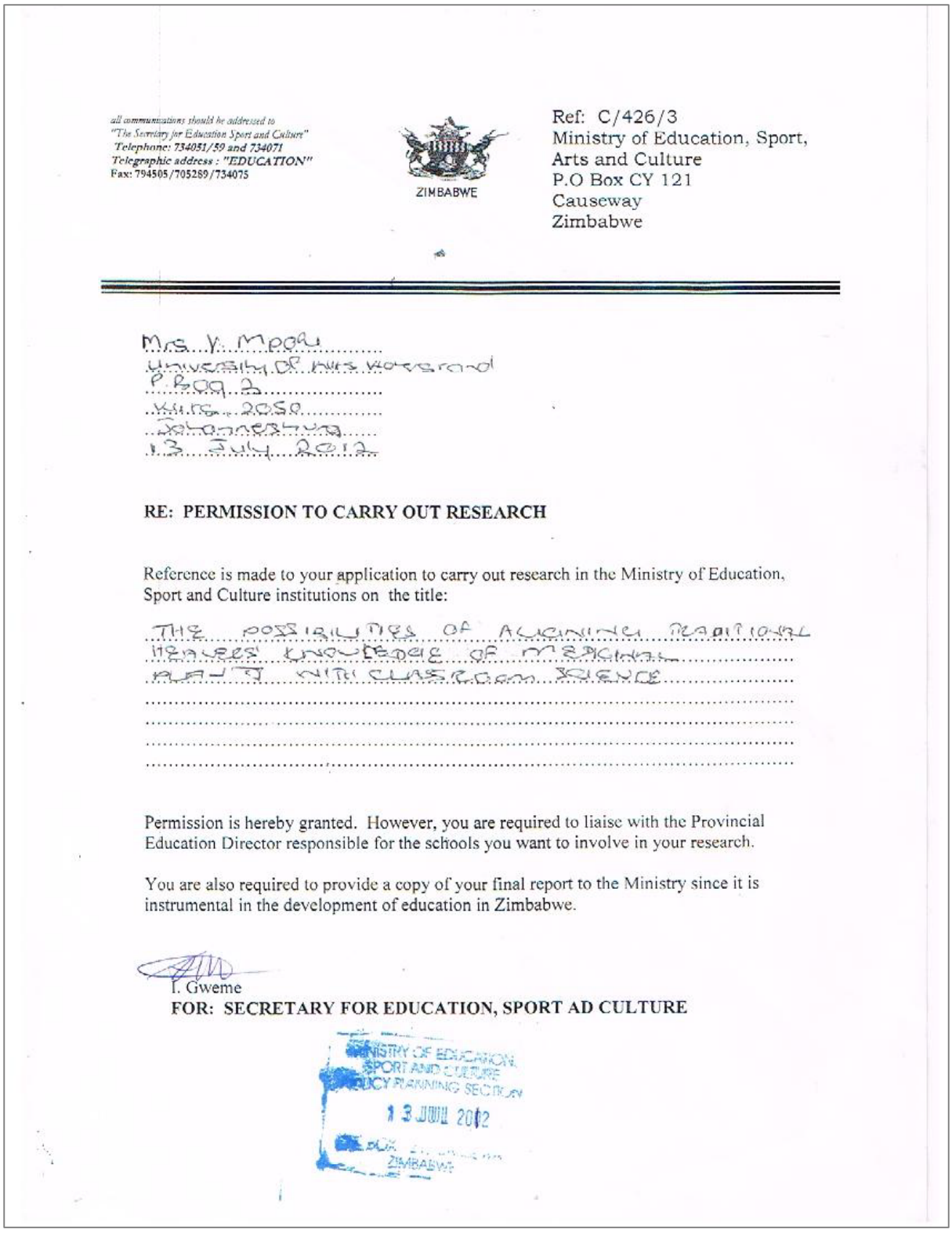
M Mabeta

Matsie Mabeta
Wits School of Education

011 717 3416

Appendix C: Conduct of research authorities

C-01: Ministry of Education



all communications should be addressed to
"The Secretary for Education Sport and Culture"
Telephone: 734051/59 and 734071
Telegraphic address : "EDUCATION"
Fax: 794505/705289/734075

ZIMBABWE

Ref: C/426/3
Ministry of Education, Sport,
Arts and Culture
P.O Box CY 121
Causeway
Zimbabwe

Mrs. Y. Mpofu
University of Kwa Zulu Natal
P. Bag 2
Kwa Dabeka
Durban
13 July 2012

RE: PERMISSION TO CARRY OUT RESEARCH

Reference is made to your application to carry out research in the Ministry of Education, Sport and Culture institutions on the title:

THE POSSIBILITIES OF ALIGNING TRADITIONAL LEARNERS' KNOWLEDGE OF MEASURING AND TIME WITH CLASSROOM SCIENCE

Permission is hereby granted. However, you are required to liaise with the Provincial Education Director responsible for the schools you want to involve in your research.

You are also required to provide a copy of your final report to the Ministry since it is instrumental in the development of education in Zimbabwe.

I. Gweme
FOR: SECRETARY FOR EDUCATION, SPORT AD CULTURE

MINISTRY OF EDUCATION, SPORT AND CULTURE
POLICY PLANNING SECTION
13 JUL 2012
P.O. BOX CY 121
ZIMBABWE

C-02: Mashonaland Central Province: Ministry of Education

Ref: Research Work

All communications should be addressed to
"The Provincial Education Director
Mashonaland Central Province"
Telephone: 071- 6992/6
Fax: 071-6997

ZIMBABWE

Ministry of Education, Sport and Culture
Mashonaland Central Province
P. O Box 340
Bindura
Zimbabwe

09 July 2012

Mrs. Vongai Mpofu
WITWATERSRAND
SOUTH AFRICA

PERMISSION TO CARRYOUT A RESEARCH IN MASHONALAND CENTRAL PROVINCE SCHOOLS: SUPERVISED BY UNIVERSITY OF WITWATERSRAND IN SOUTH AFRICA: MASHONALAND CENTRAL PROVINCE:

The matter refers:

The Provincial Education Director grants you the Permission to carryout the research so applied for in the specified area of study without deviation as per your application dated 16 July 2012
Please take note that as soon as you finish your research on, 'Possibilities of integrating traditional plant healing with classroom science at junior certificate level in Zimbabwe.' it is incumbent upon you to furnish the Ministry with your findings, as this is likely going to assist in improving the ministry's endeavors to promote meaningful education to its clientele.

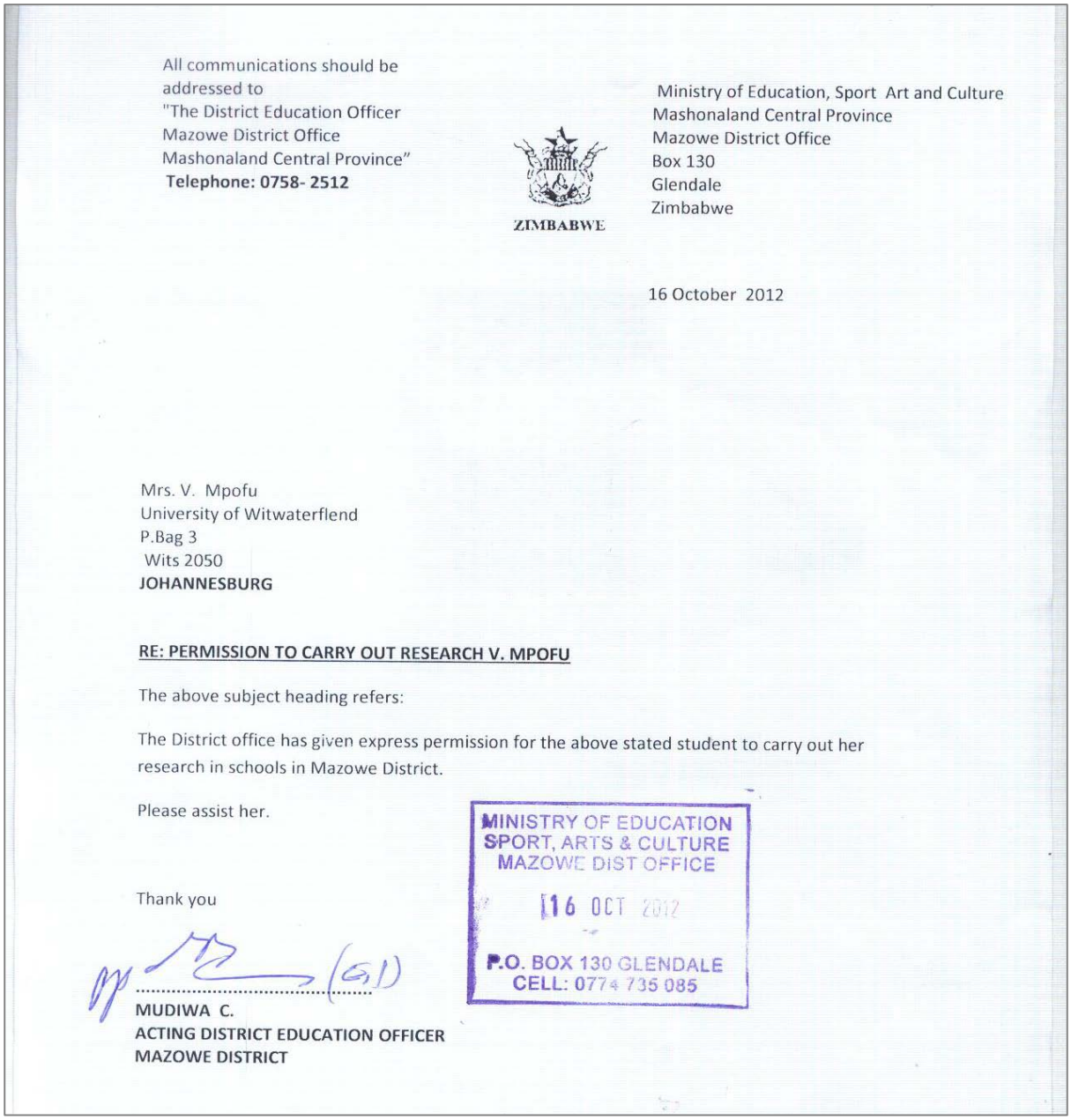
Thank you,

B. C. MUSHORE

DEPUTY PROVINCIAL EDUCATION DIRECTOR
MINISTRY OF EDUCATION, SPORT & CULTURE
09 2012
P.O. BOX 340
BINDURA

FOR: THE PROVINCIAL EDUCATION DIRECTOR
MASHONALAND CENTRAL PROV

C-03: Mazowe (Chiweshe) District: Ministry of Education



All communications should be addressed to
"The District Education Officer
Mazowe District Office
Mashonaland Central Province"
Telephone: 0758- 2512

ZIMBABWE

Ministry of Education, Sport Art and Culture
Mashonaland Central Province
Mazowe District Office
Box 130
Glendale
Zimbabwe

16 October 2012

Mrs. V. Mpofu
University of Witwaterflend
P.Bag 3
Wits 2050
JOHANNESBURG

RE: PERMISSION TO CARRY OUT RESEARCH V. MPOFU

The above subject heading refers:

The District office has given express permission for the above stated student to carry out her research in schools in Mazowe District.

Please assist her.

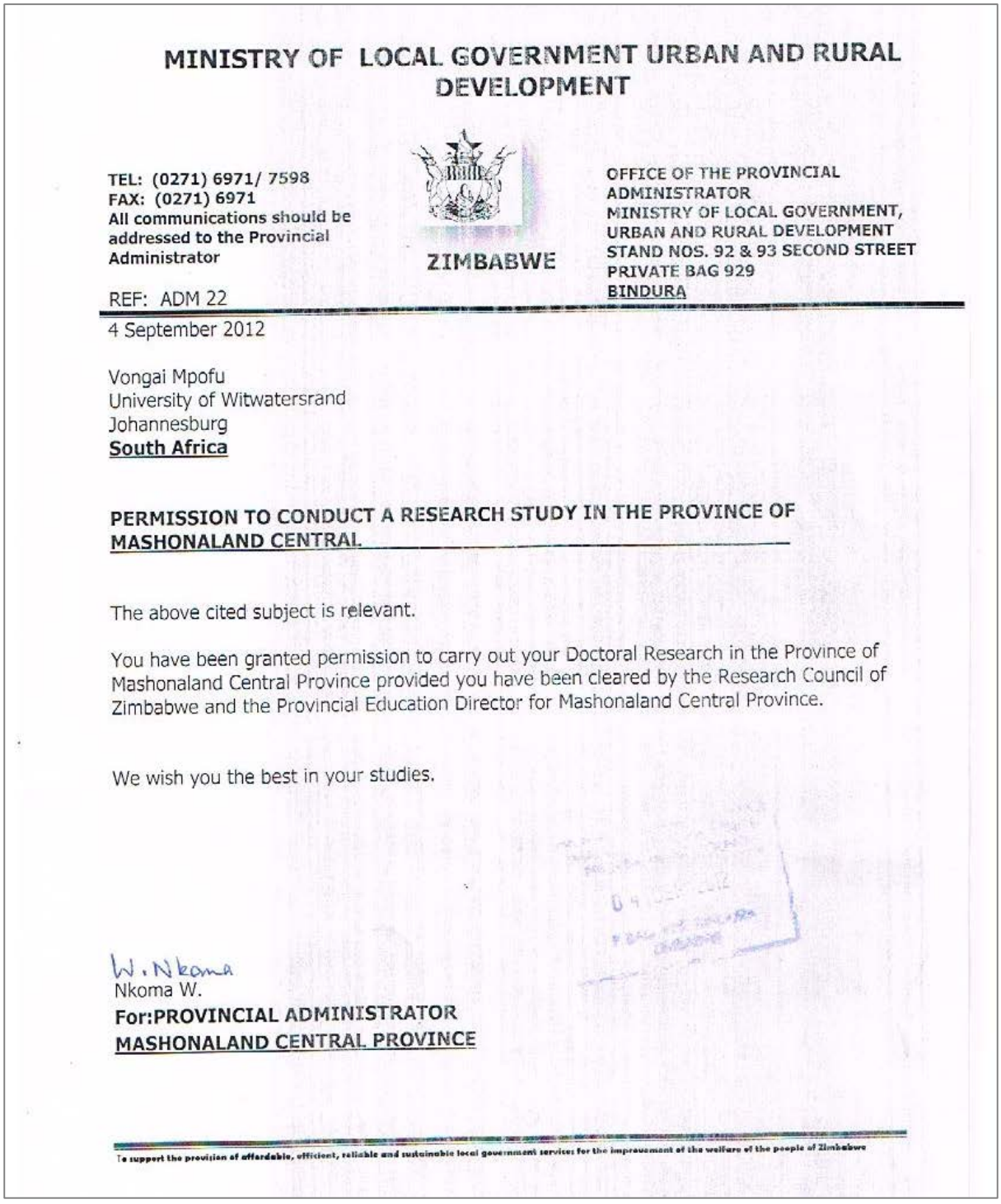
MINISTRY OF EDUCATION
SPORT, ARTS & CULTURE
MAZOWE DIST OFFICE
16 OCT 2012
P.O. BOX 130 GLENDALE
CELL: 0774 735 085

Thank you

.....

MUDIWA C.
ACTING DISTRICT EDUCATION OFFICER
MAZOWE DISTRICT

C-04: Mashonaland Central Province: Ministry of Land Development



MINISTRY OF LOCAL GOVERNMENT URBAN AND RURAL DEVELOPMENT

TEL: (0271) 6971/ 7598
FAX: (0271) 6971
All communications should be addressed to the Provincial Administrator

REF: ADM 22

ZIMBABWE

OFFICE OF THE PROVINCIAL ADMINISTRATOR
MINISTRY OF LOCAL GOVERNMENT, URBAN AND RURAL DEVELOPMENT
STAND NOS. 92 & 93 SECOND STREET
PRIVATE BAG 929
BINDURA

4 September 2012

Vongai Mpofu
University of Witwatersrand
Johannesburg
South Africa

PERMISSION TO CONDUCT A RESEARCH STUDY IN THE PROVINCE OF MASHONALAND CENTRAL

The above cited subject is relevant.

You have been granted permission to carry out your Doctoral Research in the Province of Mashonaland Central Province provided you have been cleared by the Research Council of Zimbabwe and the Provincial Education Director for Mashonaland Central Province.

We wish you the best in your studies.

W. Nkoma
Nkoma W.
For:PROVINCIAL ADMINISTRATOR
MASHONALAND CENTRAL PROVINCE

To support the provision of affordable, efficient, reliable and sustainable local government services for the improvement of the welfare of the people of Zimbabwe

C-05: Mazowe (Chiweshe District): Ministry of Land Development

MINISTRY OF LOCAL GOVERNMENT, RURAL AND URBAN DEVELOPMENT

TEL: (0375) 2262/3
FAX: (0375) 2484
All communications should be addressed to the District Administrator

ZIMBABWE

REF:

THE DISTRICT ADMINISTRATOR
MAZOWE DISTRICT
P O BOX 100
CONCESSION

7 November 2012

Ms Vongai Mpofu
University of Witwatersrand
JOHANNESBURG
South Africa

RE: **PERMISSION TO CONDUCT A RESEARCH STUDY IN MAZOWE DISTRICT: MASHONALAND CENTRAL PROVINCE**

The above refers.

This serves to confirm that you have been granted permission to carry out your Doctoral Research in Mazowe District.

Best wishes.

S Nyakudya
For **DISTRICT ADMINISTRATOR – MAZOWE**
SN/rh

C-06: Research Council of Zimbabwe

RESEARCH COUNCIL OF ZIMBABWE

Leadership, Innovation and Development

Cabinet Office
Block A, Delken Complex
Mt Pleasant Business Park
P.O. Box CY294, Causeway
Harare, Zimbabwe
Tel. 263-4-369407/8
Fax: 263-4-369409
Email: secretary@rcz.ac.zw
Website: www.rcz.ac.zw

REF SC/9

31 October 2012

Vongai Mpofu
University of Witwatersrand
Private Bag 3 wits 2050
Johannesburg
South Africa

Dear Vongai

Application to conduct program of research study by Vongai Mpofu: PhD chemistry education student.

We acknowledge your letter dated 6 September 2012 in which you sought permission to conduct a program of research study titled: The possibilities of aligning traditional healers' knowledge of medicinal plants with classroom science. This is for partial fulfilment of your PhD chemistry education at University of Witwatersrand.

We refer you to the Medical Research Council of Zimbabwe (MRCZ), the regulator of research on human subjects. The MRCZ is located at Corner J. Tongogara and Mazowe Street.

The Research Council of Zimbabwe considers foreign researchers' applications for clearance and registration to conduct research in Zimbabwe or applications of local researchers conducting research on behalf of foreigner or foreign entities.

We wish you all the best in your studies.

Yours sincerely

Dr. N. Midzi
For Executive Director

RESEARCH COUNCIL OF ZIMBABWE
CABINET OFFICE
31 OCT 2012
TECHNICAL OFFICE
P.O. BOX CY 294
CAUSEWAY, HARARE

Board Members: Mr E M Makonese *(Chairman)*, Prof I Sithole- Niang (*Vice Chairperson*), Mr S C Chigwamba, Prof I T Gangaidzo, Dr D Garwe, Mr P Kunaka, Prof O E Maravanyika, Dr W B Mujaji, Mr D E H Murangari, Dr A Murwira, Dr N Ndiweni, Prof S Sibanda, Prof F Tagwira, Dr M J Tumbare, Prof L S Zijenah
Executive Director: Mrs S Muzite

C-07: Medical Research Council of Zimbabwe

Telephone: 791792/791193
Telefax: (263) - 4 - 790715
E-mail: mrcz@mrcz.org.zw
Website: http://www.mrcz.org.zw

Medical Research Council of Zimbabwe
Josiah Tongogara / Mazoe Street
P. O. Box CY 573
Causeway
Harare

CONTINUING APPROVAL LETTER

REF: MRCZ/B/418

07 February 2014

Mrs. V. Mpofu
University Of Witswatersrand
School Of Education
Centre for Science and Mathematics Research
P. Bag 3, 2050
South Africa

Re The Possibility Of Intergrating Traditional Plant Healing Knowledge With Classroom Science At Junior Certificate Level In Zimbabwe

Thank you for the application for review of Research Activity that you submitted to the Medical Research Council of Zimbabwe (MRCZ). Please be advised that the Medical Research Council of Zimbabwe has **reviewed** and **approved** your application to continue conducting the above titled study.

This approval is based on the review and approval of the following documents that were submitted to MRCZ for review:-

a) Completed MRCZ Form 102

- **APPROVAL NUMBER** : **MRCZ/B/418**

This number should be used on all correspondence, consent forms and documents as appropriate.

- **TYPE OF MEETING** : **Full Board**
- **EFFECTIVE APPROVAL DATE** : **07 February 2014**
- **EXPIRATION DATE** : **06 February 2015**

After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the MRCZ Offices should be submitted three months before the expiration date for continuing review.

- **SERIOUS ADVERSE EVENT REPORTING**: All serious problems having to do with subject safety must be reported to the Institutional Ethical Review Committee (IERC) as well as the MRCZ within 3 working days using standard forms obtainable from the MRCZ Offices or website.
- **MODIFICATIONS**: Prior MRCZ and IERC approval using standard forms obtainable from the MRCZ Offices is required before implementing any changes in the Protocol (including changes in the consent documents).
- **TERMINATION OF STUDY**: On termination of a study, a report has to be submitted to the MRCZ using standard forms obtainable from the MRCZ Offices or website.
- **QUESTIONS**: Please contact the MRCZ on Telephone No. (04) 791792, 791193 or by e-mail on mrcz@mrcz.org.zw

Other

- Please be reminded to send in copies of your research results for our records as well as for Health Research Database.
- You're also encouraged to submit electronic copies of your publications in peer-reviewed journals that may emanate from this study.

Yours Faithfully

.....

MRCZ SECRETARIAT
FOR CHAIRPERSON
MEDICAL RESEARCH COUNCIL OF ZIMBABWE

MEDICAL RESEARCH COUNCIL OF ZIMBABWE
2014 -02- 07
APPROVED
P.O. BOX CY 573 CAUSEWAY, HARARE

PROMOTING THE ETHICAL CONDUCT OF HEALTH RESEARCH

C-08: Ministry of Health and Child Welfare

P.M.D. Direct Line 6764
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MINISTRY OF HEALTH AND
CHILD CARE
PROVINCIAL MEDICAL DIRECTOR
Mashonaland Central
P O Box 98
Bindura
Zimbabwe

10 December 2013

TO WHOM IT MAY CONCERN

REF: PERMISSION TO CONDUCT A RESEARCH STUDY IN MAZOWE DISTRICT: MASHOANLAND CENTRAL PROVINCE

The above subject refers.

This serves to confirm that Mrs V. Mpofu has been granted permission to carry out her doctoral Research in Mazowe District.

Sincerely

MINISTRY OF HEALTH
PROVINCIAL MEDICAL DIRECTOR
MASHONALAND CENTRAL
10 DEC 2013
P.O BOX 98
BINDURA
ZIMBABWE

Dr S.H. Mukungunugwa
ACTING PROVINCIAL MEDICAL DIRECTOR – MASHONALAND CENTRAL

DISTRICT MEDICAL OFFICER
MINISTRY OF HEALTH & C.W
CONCESSION DISTRICT HOSPITAL
01 APR 2014
P.O BOX 70 CONCESSION
ZIMBABWE

Approved.

C-09: Ailment by body region image consent

37 Nande Villas
Bindura
Zimbabwe

23 January, 2014

To whom it may concern

This letters serves to notify that I, Tatenda B Mpofu have concerted to the use of my picture(s) in the research thesis entitled "Possibilities of integrating indigenous knowledge into classroom science: The case of plant healing" conducted by Vongai. Mpofu as fulfilment of her Doctoral studies and The University of Witwatersrand.

You can conduct me on the following details for any further clarifications.
E-mail: tbmpofu25@gmail.com
Cell: +263 (0) 775 504 929

Yours sincerely



Tatenda B Mpofu

Appendix D: Request for participation and consents

D-01: Application to conduct program of research

I am seeking your permission to conduct a program of research study titled **"The possibilities of aligning traditional healers' knowledge of medicinal plants with classroom science".** This program of research study will involve traditional healers, science teachers and learners interacting with the researcher. The participants may also be requested to interact with each in the event that such a need arises.

Purpose: The purposes of this program of research study is to (1) understand and document the IKoPH; (2) develop contextualized and integrative ZJC level curriculum material from the traditional healers' knowledge of medicinal plants and science; and (3) illustrated how IKoPH can be intergraded into classroom science.

Procedures: During this study image and voice will be recorded on video and audio devices as the participants interact with researcher. Participants' interaction with traditional healer(s), learners and teachers is mainly through conversations at individual or small-group levels. Selected excerpts (clips) from the video interactive recordings of may be played and used for small-group discussions/meetings and in the dissemination of what is learned from this study.

Risks: There are no potentially harmful risks related to participating in this study, except for the possible embarrassment of the participant seeing her/himself and/or hearing her/his voice in video or audio recordings when segments (clips) are shown in small-group discussions/meetings.

Benefits: There is no direct benefit from this program of study to the participant. However, as a result of participation, the learners' and teachers' individual awareness about school, science, medicinal plant local knowledge, curriculum material development and teaching and learning may be increased. This program of study will provide participants, the school, the University, and Ministry of Education, Sport, Art and Culture, the field of science education with valuable insights into the integration of local medicinal plant into the teaching and learning of science and how learner (s) teacher(s) and local elders interact to enhance individual and collective successes in the science classroom.

Disclaimer/Withdrawal: Participation is completely voluntary and participants may withdraw at any time without any prejudice or penalty against them. Withdrawal from

participation or refusal to participate in this study will not in any way affect participants' marks, performance or position in your school or at Wits School of Education.

Alternatives: Participants may choose not to participate in this study. If a participant chooses not to participate, no references to him/her will be made in the reporting of this study. Participant's image(s), if it appears anywhere, will be blurred or silhouetted so that the participant will not be visually recognized; and participant's voice(s) will be muted or scrambled so that his/her voice will not be recognized.

Compensation: Participants will receive no financial or any other compensation for participating in this study. This research is not for any grades or marks.

Confidentiality: All information collected in this study will be kept private and you will not be identified by name. Confidentiality and anonymity will be maintained as pseudonyms will be used in place of proper names of individuals and location of study. The researcher will keep the audio and video recordings from this study in a locked filling cabinet. Only the researchers will have access to these and they will be destroyed by December 31, 2018.

Participant's Rights: If a participant wishes for further information regarding his/her rights as a research participant, he/she may contact: Human Research Ethics Committee (HREC) at 0117173055 or Ms. Matsie Mabeta via email at Matsie.Mabeta@wits.ac.za.

Conclusion: I have since been cleared by the Human Research Ethics Committee of the University of Witwatersrand as per attached letter. If you have any concerns or questions about the conduct of this program of research study (project) you may contact me at location stated above. Permission to conduct this research has also been granted at various relevant levels of the Ministries of Local government, Rural and Urban development and Education, Sport, Art and Culture as per the attached communications.

What signing this form means: By signing this letter, you agree to give permission for this program of research study to be conducted in your school. The purpose, procedures to be used, as well as, the potential risks and benefits of participation have been explained in detail. You or participants can refuse to participate and/or withdraw from this program of research study at anytime without penalty. Refusal to participate in or withdrawal from this study will have no effect on participants in any way, whatsoever. You will be given a copy of this consent form after you have signed it for your record.

The application form is also available in Shona

D-02: Informed Consent Form (for adult participants)

Authorisation: By signing this letter, you agree to give your consent to participate in this program of research study. You are making a decision whether or not to participate in this study. Your signature indicates that you have read and understood the information provided above, have had all your questions answered, and have decided to participate.

Name of Research Participant (please print)	Date
Signature of Participant	Time

YOU WILL BE GIVEN A COPY OF THIS CONSENT FORM TO KEEP.

The informed consent form is also available in Shona for healers and Elders

D-03: Informed Consent Form (for learner participants)

Authorisation: By signing this letter, you agree to give your consent to participate in this program of research study. You are making a decision whether or not to participate in this study. Your signature indicates that you have read and understood the information provided above, have had all your questions answered, and have decided to participate.

Name of Research Participant (please print)	Date
Signature of Participant	Time
Name of parent or guardian *(please print)*	Date
Signature of parent or guardian	Time

YOU WILL BE GIVEN A COPY OF THIS CONSENT FORM TO KEEP

The informed consent form is also available in Shona for parents.

D-04 Statement of Consent to be photographed, Audio-taped or videotaped

I understand that photographs / audio recordings / video recordings will be taken during the study. (Mark either "Yes" or "No")

- I agree to having my **photograph taken** **Yes** ☐
  No ☐
- I agree to **being audio recorded** **Yes** ☐
  No ☐
- I agree to having my **video recorded** **Yes** ☐
  No ☐
- I agree to having my **participation in study** **Yes** ☐
  No ☐

Name of Research Participant *(please print)*	Date
Participant's signature	Time
Researcher's signature	Time
Name of Witness	Date
Witness's signature	Time

YOU WILL BE GIVEN A COPY OF THIS CONSENT FORM TO KEEP

The informed consent form is also available in Shona for parents, healers and Elders

D-05: Schools Consent form

Authorisation: By signing this letter, you agree to give permission for this program of research study to be conducted in your school. You are making a decision whether or not to participate in this study. Your signature indicates that you have read and understood the information provided above, have had all your questions answered, and have decided to participate.

Name of Head (please print)	Date
Signature of Head or legally authorized representative	Time
Name of researcher (please print)	Date
Signature of researcher	Time

Appendix E: Observation and/conversation issues

Observation and conversations, other than written task based, were not pre-determined. I drew questions or comments I made in response to the participants' actions and expressions from the main issues which this study sought to address as highlighted in the following OBSCON frame.

1. Tendera community context
   a. What is the general way of life of the people in Tendera community?
2. Indigenous knowledge of plant healing in the community of Tendera
   a. Who uses local plants for healing?
   b. How have or are people of Tendera gained or gaining knowledge of plant healing?
   c. What worldviews do people who use indigenous plants for healing in Tendera community hold?
   d. Which plants are used for which ailments? In what ways are they used?
3. Curriculum
   a. Are there any aspects of this indigenous knowledge of plant healing in the ZJC science curriculum?
   b. Where in the ZJC science curriculum can some aspects of indigenous knowledge be placed?
4. Integration
      a. What aspects of indigenous knowledge could be integrated in the curriculum?
      b. How can these aspects be included in the curriculum
      c. How can these aspects be taught?
      d. Who can teach these aspects?
      e. What context is best suited for teaching these aspects

Appendix F: Learner tasks

F-01: Task based discussion outline

Tasks		Session Dates	
No.	**Topic**	**Deve**	**Gomo**
0	*Ngati kurukurei* Let us discuss	11/09/2013	12/09/2013
1	*Mishonga inorapa zvirerwe* Healing plants	18/09/ 2013	26/09/ 2013
2	*Zvirwere mudunhu redu* Ailments in our community	25/09/ 2013	26/09/ 2013
3	*Kurapiwa kwezvirwere* Treating Ailments	25/09/ 2013	03/10/ 2013
4	*Chii charwariswa mhunhu?* What caused this person to be ill?	02/10/ 2013	03/10/ 2013
5	Vanorapa zvirwere Who are the practitioners?	02/10/ 2013	03/10/ 2013
6	*Kuwana ruzivo rweMishonga* Acquiring healing plants knowledge	09/10/ 2013	10/10/ 2013
7	*Kudzidza zvechiZezuru* Learning about Zezuru tradition	09/10/ 2013	10 10/ 2013
8	*Kuziva nezekurapa kweChivanhu* Knowing about indigenous healing	16/ 10/2013	18/10/ 2013
9	*ChiVanhu chakakodzera kudzidziswa muzvikoro* Healing plants for school curriculum	16/10/2013	18/10/ 2013
10	*Zvechizezuru nezvidzidzo zechikoro* Zezuru knowledge and school subjects	06/11/2013	07/11/2013
11	*Zvirairwa zvemishonga yechiVanhu* Taboos	06/11/2013	07/11/2013
12	*Mhiko nemishonga yechiVanhu* Rituals in healing with plants	20/11/2013	14/11/2013
13	*Nyanvi dzedu dzezvokurapa* Our indigenous healing experts	27/11/2013	22/11/2013

14	*Nzvimbo dzinorapirwa vanhu* Places for healing	27/11/2013	28/11/2013
15	*Utano hwangu* My health	02/12/2013	04/12/2013
16	*Kurapiwa kwagu* Being treated	02/12/2013	04/12/2013
17	*Dede Muzengerere* About plant healing song	03/12/2013	10/02/2013
18	*Nyaya yokurwara kwamai Remekedzai* The story of mother of Remekedzai's illness	12/02/2014	17/02/2014
19	*Nyaya dzinoenderana neya mai Remekdedzai* The story of mother of Remekedzai's illness	19/02/2014	24/02/2014
20	*Miti inoyera* Sacred trees	26/02/2014	07/02/14
21	*Miti ino zunguzika* A tree song	05/02/2014	10/03/2014
22	*Unoziva detembo* Do you know poem	19/03/2014	10/03/2014
23	*Hope dzavaChiriku* Elder Chiriku dreams	19/03/2014	21/03/2014
24	*Nyaya yasekuru Guti* The story of sekuru Guti	26/03/2014	24/03/2014
25	*Chirwere chemhopo muno* The warts disease in this community	26/03/2014	28/03/2014
26	*Tinoti kudii?* What do we say?	31/03/2014	31/03/2014

F-02: Task based discussion sample

Card 20: Miti inoyera (Sacred Trees)

1. *Ndeyipi miti yemisango yaunoziva inoyereswa mudunhu rino?*
   Which trees are regarded as sacred in this community?
2. *Zviyera zvemiti iyi ndezvipi?*
   What are the sacredness of these trees?
3. *Sei Vanhu vemudunhu rino vachiyeresa miti iyi?*
   Why do people respect these trees as sacred?
4. *Ungada here kudzidziswa kuyera kwemiti kuchikoro?*
   Ipa tsanguro izire kumhinduro yako.
   Would you like to learn about these trees in your school subjects?
   Give a reason for your answer.
5. *Kana mhinduro yako yomu (4) iri hongu ungada kudzidza izvi muzvidzidzo zvipi? Tsanangura zvizere mhinduro yako*.
   If your answer in question 4 is yes, in which school subject would you like to learn about sacred trees?

Appendix G: ZJC science syllabus format example

UNIT 1: HEALTH

This unit looks at health. Human parasitic diseases, child care, and sexually transmitted diseases are discussed.

TOPIC		ASSESSMENT OBJECTIVES Pupils will be able to:	CONTENT	NOTES AND ACTIVITIES
I.1	Health and disease	- explain the meaning of health; - identify the main causes of diseases.	Individual and community health. Pathogens, chemicals and poisons, poor nutrition, genetic defects.	Health as a state of physical, mental and social wellbeing, not just an absence of disease.
I.2	Human parasitic diseases	- describe ways by which diseases are transmitted; - explain the term parasite; - identify examples of common parasitic - diseases; - describe the life cycle of - bilharzias parasite; - identify symptoms of - bilharzia - explain how can be - prevented.	Water, food, air, vectors and close contact. Parasitic mode of life. Bilharzias and malaria. Egg; parasite of snail, free living larva; worms in human (adult parasite). Symptoms of bilharzias Breaking the life cycle.	Examples of diseases transmitted by each mode. Parasite as an organism which depends on another organism (host) to obtain its food. Correct use of chloroquine in the treatment of malaria to be discussed. Terms miracidium and cercarium not required. Excessive weakness and blood in urine or faeces. Treatment restricted to visit to clinic or hospital for medical help. Prevent by breaking the life cycle.

Appendix H: Data codes

	Code
Personal Experiences	
Self-centred personal experiences	PES
Interactive personal experiences	PEI
Observation	
General Observations	OG
Observed Critical Incidences	OCI
Conversations	
Conversation Interviews	CI
Conversation Talks	CT
Conversation Discussions	CD
Objects	
Curriculum documents	CD
Participants documents	PD
Artefacts objects	AO
Stories	AOS
Poems	AOP
Symbols	AOY
Rituals	AOR
Ceremonies	AOC

Appendix I: An example of conversation talk audio transcript in Shona language

The conversation below start mid-way after we had separated with Mr. Rusa and Headman Gomo because sekuru Nzou wanted to show the healing plant he uses for cancer treatment to me only.

Session Number:	4 of 4
Date:	23 March, 2014
Sessioning place:	Stated in the thatched hut at the healers' homestead and ended in the nearby bush
Sessioner:	Sekuru Nzou
Category and type of participation:	Core-individual healer
Approximate time:	10: 00-15:00 (5hrs)
In session:	Elder Gomo and Mr. Rusa who were later excused

Vakutsigira: Makati imi '[k]uziva mbuya huudzwa' zviya ndabvunza kuti ruzivo rwekurapa makaruunganidza sei mubhuku renyu iri. Itsumoka. Mairevei SaManyanga?

Sekuru Nzou: ChiZezuru mhamha. Imwe mishonga inobva mukufamba kwatinoita. Paunenge uchifamba zviya zviya dzimwe nguva unosangana nomunhu ane mwoyo wakanaka anoti unoziva kuti uyu mushonga unorapa zvakati wobva wato batisisa.

Vakutsigira Kuudza munhu mushonga mwoyo wakanaka here saManyanga?

Sekuru Nzou: Hongu. Sezvandombotaura zviya zvekuti mishonga yechiVanhu haingotaurwi taurwi. Inopa munhu upenyu, anoita mari. Saka munhu anokutaurira mushonga pasina mari kana chii mhunhu akanaka.

Vakutsigira: Chokwadi? Handei zvedu mberi. Ndine urombo nokukupingirai ndinenge ndabatwa nemamwe mahwi andinenge ndichida kuhwisisa. Handiti mati kuziva mbuya huudzwa.

Sekuru Nzou: A-a ndizo zvinoitika mukukurukura. Kuti tirimuchikoro here tinobva tadzi usataura kana ticha vasti vati taura [tinoseka]. Mahwi chikaranga chinoreva manzwi zvese mashoko (tinoseka zvakare). Pobva paita kuti pamwe ndairwara, ndikaenda e-e-e… [vanonyara zvakare vachitaridza kufunga kwakadzama]. E-e, ndakenda kune vamwe vakuru vaya vandakati vakapfuura [vanotaridza kushushikana].

Vakutsigira: E-e, makati vakashaya pasi pano panorema veduwe.

Sekuru Nzou: Hongu ivavo. Imwe nguva ndaivashanyira. Vaikuudza kuti mushonga uyu shandisa zvakati nezvakati asi kuti vakududzire dzinde kwete [vanonyarara voti] handiti ndakambokuudzai nyaya iyi. But nenguva ndefu yandaita ndichishandisa mishonga, ndaiti ndikaunwa ndoti a mushonga uyu wakafanana newendakamboshandisa. Vakuru ava vakandipa mushonnga weupfu asi havana kundiudza dzinde racho. Ndakanwa mushoinga uyu ndikanzwa uchifanana neumwe wandakambopiwa navamwe vakuru. [Vachitaridza ungwaru] izvi zvakaita kuti ndiutarisise ndikati a-a mushonga uyu ndakambomushandisa wakafanana neuya wandakaratidzwa nava vakuru vaya vaya uye ndaushandisa kwemazuva. Ndoinda kunouchera. Ndofananidza nouya ndounanzva zvobva zvafanana. Mawe maziviro andinoita iwayo. Saka ndakakwira gomo iro {vachitendeka gomo riri pedo nemusha wavo) ndikauchera, ndikauya nawo pano ndakaugadzira nekunanzva. Zvakabva zvapindirana. I-i-i, mimwe ndinongonzwawo vamwe achitaurirawo mumwe. Hamuzivi here nherera inorairwa panorairwa mwana waMambo.

Vakutsigira Ndizvozvo.

Sekuru Nzou: Iwe uripo unezvawafambira, kungava kusunza kana kuonamurwere zvikataurwa wobva wanyanya kuteerera nokucherechedza zvakanyanya.

Vakutsigira: Kuvhura nzeve nemaziso [tinoseka].

Sekuru Nzou: Zvino mukana wakadaro wamuka ndino nyatso teerera zvirairwa izvi. Vakuru vanosimba nokuporesa kana munhu zvamunyanya. Pakadaro vanoburitsa madzinde avo mukuraira vanopepa murwere.

Vakutsigira: Chokwadi apa ndapabata. Saka…

Sekuru Nzou: Pamwe unotonyatsoziva kuti vakuru vanoziva makwenzi, saka kana ndine mushonga wandinoda ndinotoenda kuno vabvunza direct. Kana vari vane mwoyo wakanaka sokutaura kwatamboita kuya vainditaurira. Vamwevo vanotsumba kufa nemakwenzi avo. Vamwe vainotondirakidza kuti vanoziva asi vanoda badza kanamatendo kuti vadudze dzinde ravo. Pandaizvikwanisa ndaibva ndazviita saizvozvo.

Vakutsigira: Badza kana matendo acho ari eyi uye munoita mutenderoi?

Sekuru Nzou: Mari, mbudzi, huku, zviyo zvese zvinoita, chete mazuva ano vazhinji voda mari. Ha-a handingati ndakabhara mari, but mumwe munhu anokuratidza kuti a-a-a zvandakuitira izvi unofanira kuti uwanewo zvaunondiitira.

Vakutsigira: Ummm zvemari zvinoitika!

Sekuru Nzou: Chose, mashimisika. Iwe ndiwe unozongotsvaga kuti munhu uyu anofarira chii?

Vakutsigira: Saka mave nenguva muchitsvaka njere idzi ka?

Sekuru Nzou: Ha-a kwave kare sokutaura kwandakamboita zviya kuti baba vachifa ndakatanga kuti a-a, ko uyu arwara nemudumbu kana musoro ndoita sei? Apa mari yechipatara hapana. Saka zvakabvira kare.

Vakutsigira: Zviri munzeve.Saka hwengeredzo iyi ndiyo yamuri kuti kuziva mbuya huudzwa?

Sekuru Nzou: Hongu

Vakutsigira: Saka ruzivo rwese urwu nderwekuudzwa hamuna zvime zvipo

Sekuru Nzou: U-u-u [vano nyarara kwekanguva] Handidi kutaura zvimanyepo. [vanonyarara zvakare]. Ndakarotswa kamwe chete chete muchindiona ndabva zero kudai [vanonyarara zvakare]. Ndakarota mushonga ndikazobvunza vamwe vakati mushonga wemhepo.

Vakutsigira: Wokudzinga mamhepo?

Taderera: Kwete, mhepo yomudumbuka

Vakutsigira: Ho-o unogona kuyeuka here marotso acho

Sekuru Nzou: A-a ini ndakatongorota ndiine vamwe vakuru vakandiudza kuti tora mushonga uyu uise mumvura vana vapote vachinwa.

Vakutsigira: Maiva neukama navo here?

Sekuru Nzou: Kwete handingati ndivasekuru kana ani kana kuti ndizive kuti ndiani, asi kungoti aiva munhu wechikuru.

Vakutsigira: Saka kubva ipapo hamuna kuzomboita mamwe marotso anoenderana nezvemishonga kana zvimwe?

Sekuru Nzou: A-a, handidi kunyepa handina**.**

Vakutsigira: Saka rwenyu rwese ruzivo ruzhinji nderwe kushingirira kutsvakiridza

Sekuru Nzou: Hongu

Vakutsigira: Pane nyaya iya yamakambondiudza iya yokuti makaona mhunhu ainzwa mudumbu. Gara zviya handichanyatsi kuiziva zvakanaka [ndinonyarara ndichifunga]…Makati semhunhu ave muresearch yedu iyi makabva mateereresa chaizvo. Kuchinzi ndikawanawo here badza imwi mukati

munoridii? Handichanyatsi iziva asi imi ndakuyechidzai munoiziva. Mungawanawo badza here, Anenge anga akagara pamuti wavaida kuchera here? Muchaiyiziva.

Sekuru Nzou: Munotondera imwi e-ka yanga iri nyaya yenhingirikiri, yenhingi… Ya-a nyaya yacho ndeye n'ongo, taitobva kurufu saka vamwe vakanga vakamira pamberi pedu takawana vakamira pamucherekesi.E-e muchekeresi, vaida banga rokukwatura makwati emucherekesi. E-e matondifungisa imwe nzira futi yokuziva mbuya huudzwa. Umwe wacho waitoshupika nen'ongo saka vaitsvaka banga ndikati muri kuridii? Zvikanzi tinoda kukwatura makwati aya. Ini ndikati ndeeyi? Zvikanzi ndeekurapa n'ongo. Ndikabva ndabvunza ipapo kuti munoasevenzesa sei? Zvikanzi unongoisa mumvura wonwa. Ndokubva ndavapa banga vakakwatura. Uyu airwara atoratidza kuti arikuda kubudisa nokumuromo [vanosunga uso vachiratidza kusema] asi zviri kunetsa. Semaziviro andinoita kana munhu aine n'ongo hafariri kudya. Asi kwakazoti kwapera kuda maawa anoita two murume iyeye ndakazomuona ave pataundiship atonwa mabhodhoro ecoke nechingwa ndakatarisa. Ndakazongowandirwa nokutaura ndaida kumubvunza kuti a-a saka zvazokubatsira here, asi ndakawandirwa dai ndatonyatsonzwisisa kurapa kwemucherekese.

Vakutsigira: Zuva rakarekare iroro ndiro ranga ave kutonwa… Anga atorapiwa ipapo

Sekuru Nzou: Ehe-e Aikaka ndipo pandiri kureva kuti ndakazokanganwa kubvunza kuti zvazoita here nokuti angaave kutonwa. Ndaktomboshupika nokuti vanhu vacho havasi vemuno. Ini ndini ndakatozoyeka kuti, saka ndiye mhunhu wandapaira banga uye. Ndakangofunga kuti muti uya wamubatsira.

Vakutsigira: Saka ava vemarotso munovanzwisisa kuti zvinofamba sei?

Sekuru Nzou: Ya-a

Vakutsigira: Zvinhu zvamunototendera kuti ….

Sekuru Nzou: E-he ndinozvitenda, ndinozvitenda nokuti zvakazara muno.

Vakutsigira: Pane imwe nyaya yandakanzwa nechingani ko? Nhasi tiri paSvondo, neChitatu pandakenda kuDeve.

Sekuru Nzou: Tiperei tiinzwe

Vakutsigira: Pane vakuru vakakwira neni gomoka vachinonditaridza mumwe mushonga wavanorapisa-a-a, handichazizivi kuti itsvo here kana kuti mwoyo [apa ndaiziva asi ndaitira kuti ndisadudza mishonga yeumwe kuna vamwe ivo

vasipo]. Honai ndinofanira kutarisa pandakanyora [tinoseka]. Kuda ini handina manzinza okurapa saka muchiona ndichishingirira kutora manzwi nokunyora nokuti in ndiri munyori mumbarambadzi wakati vanatateguru vedu [kuseka zvakare]. Izvi ndinoitira kuti ndisakanganwa. Nokuti vane manzinza acho vanongorotswa. Saka mukuru uyu akanditi kunzira yokuenda kuChinu [zita rakavanduridzwa]. Pane musha wakadai dai vachinditsangurira musha uyu. Vakati ipapo pane mai vanorapa ipapo. Ndikati vanorapa sei? Zvikanzi makwenzi avo anongouya. Ivo havazivi muti wacho kana zita remishonga yavonopiwa, inongouya. Asi ukasvikapo uine chirwere chako vanoti mirai motandara zvenyu, vozoti kwapera chinguva… [Sekuru Nzou vanodimburira kutaura kwangu].

Sekuru Nzou: A-a-a. Handivazivi zvangu mai ivavo. Asi izvi ndinozvitenda. ChiZezuru chakazara nazvo.

Vakutsigira: Kwapera chinguva vanotobuda voenda kuhozi kwavo vonouya nemidzi.

Sekuru Nzou: Ndinozvitenda amai.

Vakutsigira: Makambosangana nazvo?

Taderera: E-e ndakambosangana nazvo asi ndaive ndichiri mwana mudiki. Ndakanzwa munhu wacho achingotaura achiti ukarota uchirwara unomuka mangwanani wotora badza kuenda musango. Unongochera chero pawachera paunosvika pamba wadzoka unowana pane vaenzi wobva waziva kuti uyu ndiwo muti unorapa urwere urwu as paunoenda kunochera unenge usingazivi wasundwa bedzi [Kuseka]. Ipapo ndipo pakaita kuti ndizoda kunyanyo tsvagiridza zvemamhepo yamange muchataura iyeye ndichibva kuchiChristu ndichienda kuchiMoslem. Izvozvo izvo ndakaona kuti kune vanhu vane chipo chakaita saichocho chokurotswa kana kungotora mishonga uchipa munhu kuti idya inokubatsira ndakazviva kuti zviriko [Ndakabva ndafunga nyaya yasekuru vangu hazvanzi ymai vangu yandakura ndichnzwa, as handina kududza]. Asi kuchiChrist manje zvinonzi madhimoni, mweya yakaipa. Izvo zvichibatsira munhu, vanopenga. KuchiMoslem ndakazowana kuti kune vamwe vanotonzi varapi. Vanotosevenzesa mishonga iyi.

This part story ends here on our way back to sekuru Nzou's homestead. We started talking about other things until we reunited with Mr.Rusa and Headman Gomo. Excerpt 6-11 and Excerpt 6-12 in-text on page 225 were drawn from text highlighted in yellow in this transcript.

Appendix J: Record of healing plant and ailments

	Local name growth habit	Ailment	Part	Medicating	Description
0	Any tree	*Nhenhere* diarrhoea	Flowers	Drinking medicine prepared by cold infusion of crushed flowers	Oral
		Neck pain	Stem	Rubbing neck on the tree stem where cattle have just done so.	Visitation
1	*Chifumuro Tree*	Headache	Fruit	Incision with powder prepared from dried fruits	External
		Stomach pain	Fruit Roots	Drinking medicine prepared by cold infusion of crushed plant part.	Oral:
2	*Chipindura* Tree	STI	Roots	Drinking medicine prepared by cold infusion of crushed plant par.	Oral
3	*Chividze* Herb	Diarrhoea	Roots	Chewing fresh part and swallowing juice	Oral
		Snake bite	Leaves	Balling the leaves by squeezing and rubbing with it on the affected part.	External
		Snake spits	Roots	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
4	*Dandemutande* Climber	Cancer (all types)	Root	Eating porridge sprinkled and mixed with powder prepared from dried roots.	Oral
5	*Gavakava* Herb	Ringworm Wounds Herpes	Leaf sap	Smearing sap on affected human part	External:
		Sore throat	Leaves	Gurgling lukewarm medication prepared from hot infusion of the crushed part	Mouthing
		STI Stomach pain	Leaves	Drinking medicine prepared by cold infusion of crushed leaves	Oral
6	*Jekacheka* Grass	Dysmenorrhoea	Leaves	Drinking medicine prepared by cold infusion of crushed leaves	Oral
7	*Mutandangozi** Tree	Spirit (ngozi)	Roots	Whole body washing with cold infused medicated water	External
8	*Kambuyatsamwa Grass*	Haemorrhoids	Whole	Burning dried part and allowing smoke to enter the body through the anus	Inhalation
				Ash ointment with medication prepared by burning the dried part	External
9	*Kamutondo* Herb	Chest (heart) pains	Whole plant	Eating porridge made from medicated water prepared by cold infusion of crushed roots	Oral
10	*Kanyururanhete* Tree	STI	Roots	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
11	*Katuru** Herb	Paronychia	Seeds	Drinking hot water infused medication	Oral
				Washing with the affected part with cold infused medicated water	External
12	*Mutsine* Vegetable	Blood infusion	Leaves	Drinking hot water infused medication	Oral

13	*Moringa* Tree	Blood immune booster	Seeds	Drinking hot water infused medication	Oral
		Ear	Seeds	Drinking medicine prepared by cold infusion of crushed part.	Oral
			Roots	Mouth smoking or nasal snuffing of powder prepared from dried part	Inhalation
		Eye		Dropping medicine prepared by crushing leaving and soaking them into the affected eye	Drop
		Snake bite Snake spits Stomach pain Teeth	Leaves	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
14	*Muavocado* Tree	Blood pressure	Seeds	Eating powdered porridge	Oral
15	*Mubununu* Tree	Menorrhagia	Roots	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
16	*Mubvamaropa* Tree	Diarrhoea Headache STI Stomach pains Female infertility	Bark	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
		Stomach pain Coughs	Roots		
		Colds	Seeds	Drinking hot water infused medication	External
		Fontanel	Stem sap	Rubbing sap on affected part squeezed from the part used	
		Ringworm	Pod	Ash ointment with medication prepared by burning the dried part.	
		Wounds	Bark	Powdered charcoal ointment with medication prepared by burning the dried part.	
17	*Muchecheni* Tree	Female infertility Teeth	Roots Leaves	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
18	*Muchekeche* Tree	Diarrhoea	Fibre	Chewing fresh part and swallowing juice	Oral
		Headache Wounds	Leaves Bark	Drinking medicine prepared by cold infusion of crushed part	
19	Muchekeresi Tree	Chest (heart) pains	Bark	Drinking medicine prepared by cold infusion of crushed flowers	Oral
		Ear	Pod	Drinking medicine prepared by cold infusion of crushed plant part.	
		Eye	Root	Dropping medicine prepared by crushing leaving and soaking them into the affected eye	
20	*Muchenya* Tree	Constipation	Leaves	Anal insertion of the crushed leaves	Insertion
		Headache	Roots	Mouth smoking or nasal snuffing of powder prepared from dried part	Inhalation
21	*Mudete* Tree	Teeth	Leaves	Drinking medicine prepared by cold infusion of crushed plant part.	Oral

22	*Mudomasi* Tree	Ear	Leaf sap	Dropping sap into the affected ear.	Drop
		Ringworm	Leaf sap	Rubbing sap on affected part squeezed from the part used	External
		Teeth	Leaves	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
23	*Mudorofia* Shrub	Blood pressure	Leaves	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
24	*Mufandichimuka* Herb	Stroke	Root	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
25	*Mufenje* Tree	Prostate cancer	Bark	Drinking medicine prepared by cold infusion of crushed plant part	Oral
26	*Mufufu* Tree	Epilepsy	Roots	Drinking medicine prepared by cold infusion of crushed plant part	Oral
		Miscarriage	Leaves		
		Stomach pain	Roots		
27	*Mugamu* Tree	Coughs/colds	Leaves	Drinking hot water infused medication	Oral
28	*Mugaragunguwo* Tree	Snake bites	Roots	Incision with powder prepared from dried part.	External
		Stomach pain	Roots	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
29	*Mugaranjiva* Tree/shrub	Back pain	Bark	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
		Kuvirika diarrhoea	Leaves	Chewing fresh part and swallowing juice	
		Snake bite	Roots	Washing affected part with medicine prepared from cold infusion of crushed roots	External
		Snake spits		Drinking medicine prepared by cold infusion of crushed roots	Oral
		Sore throat	Bark	Gurgling medication prepared from hot infusion of the crushed plant part	Mouthing
		Stomach pain	Leaves	Browsing the leaves like an animal	Visitation
		Bilharzia	Roots	Drinking medicine prepared by cold infusion of crushed roots	Oral
		Teeth		Drinking medicine prepared by cold infusion of crushed roots	
		Back pain	Bark	Drinking *maheu* powder medicated	
30	*Muguava* Tree	Coughs/colds	Leaves	Drinking medicine prepared from cold infused of crushed leaves.	Oral
31	*Muhacha* Tree	Evil spirit	Under tree	Visitation rituals	Visitation
		Sefure stomach pains	Bark	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
		Back pain		Drinking *maheu* powder medicated	
		Teeth	Leaves	Drinking medicine prepared by cold infusion of crushed plant part.	
32	*Mujongwe* Herb	Kidney related back pain	Root bulb	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
				Bulb rubbing on the back	External

33	*Mukonde** Tree	Teeth	Stem sap	Dropping sap on affected part	Drop
34	*Mukonono* Tree	Teeth	Bark	Drinking medicine prepared by cold infusion of crushed plant part	Oral
35	*Mukundamhuka** Herb	Teeth Cancer (all types)	Roots	Drinking medicine prepared by cold infusion of crushed roots	Oral
36	*Mukute* Herb	Back pain	Roots	Drinking medicine prepared by cold infusion of crushed roots	Oral
		Snake bite Snake spits	Leaves	Rubbing a ball of leaves prepared from squeezing	External
37	*Mukuyu* Tree	Cataract	Stem sap	Removing cataract using cotton wool ball socked sap	Visitation
		Eye		Dropping sap into the eye	Drop
38	*Mukwezvanyoka** Flower	Snake bite Snake spits	Roots	Either powder incision or sprinkling on affected part.	External
39	*Mulemon Tree*	Chest pains	Leaves	Drinking medication prepared from crushed and hot infused leaves	Oral Oral
40	*Mumbambara* Tree	Back pain STI	Roots	Drinking medicine prepared by cold infusion of crushed roots	Oral
		Blood thinning		Drinking medicine prepared by cold infusion of crushed roots	Oral
		Chest pains		Drinking medicine prepared by cold infusion of crushed roots	Oral
		Snake bite Snake spits		Incision with powder prepared from dried part.	External
		Chest pains		Eating powdered porridge	Oral
		Cancer (all types)		Eating powdered porridge	
41	*Mumvee* Tree	Constipation	Bark	Eating powdered porridge	Oral
42	*Munhanzva* Tree	Diarrhoea	Roots	Eating powdered porridge	Oral
		STI Aphrodisiac	Roots	Drinking medicine prepared by cold infusion of crushed roots.	
43	*Munhiti* Tree	STI	Roots	Eating powdered porridge	Oral
	Munhondo Tree	Headache	Roots	Drinking medicine prepared by cold infusion of crushed part.	Oral
			Fibre	Tying fibre around the head	External
		Stomach pain	Bark Fibre	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
44	*Munhundurwa* Tree	Paronychia	Root	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
		Teeth	Fruit sap	Dropping sap in hot charcoals breathing in the smoke through the mouth	Mouthing
45	*Munhunguru* Shrub	Diarrhoea	Roots	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
			Leaves	Browsing the leaves like animals	Visitation
		Eye	Leaf sap	Dropping sap into the affected eye	Drop
		Hukwakwa	Leaf sap	Smearing sap onto the affected area	External
		Stomach pain	Roots Leaves	Drinking medicine prepared by cold infusion of crushed part	Oral
		Haemorrhoids	Stem worm shelter	Drinking hot water infused medication	Oral

46	*Munyamweda* Tree	Snake bite Snake spits	Leaves	Rubbing a ball of leaves prepared from squeezing	External
47	*Munyani* Tree	Coughs Colds	Fibre	Chewing fresh part and swallowing juice	Oral
48	*Munzungu* Tree	Snake bite Snake spits	Roots	Washing affected area with medicine prepared from cold infusion	External
49	*Mupangara* Tree	Back pain	Fibre	Tying with fibre	External
		Chest pains	Roots	Mouth smoking or nasal snuffing of powder prepared from dried part	Inhalation
		Coughs Colds	Leaves	Drinking hot water infused medication	Oral
		Eye		Dropping medicine prepared by crushing leaving and soaking them into the affected eye	Drop
		Fontanel	Pods	Ash ointment with medication prepared by burning the dried part.	External
		Headache	Pods	Root charcoal incisions	External
			Roots	Chewing fresh part and swallowing juice	Oral
		Herpes	Seeds	Ash ointment with medication prepared by burning the dried part.	External
		Teeth	Parasite	Drinking medicine prepared by cold infusion of crushed parasite.	Oral
		Snake bite Snake spits	Roots	Incision with powder prepared from dried part.	External
50	*Muparamhosva* Tree	Ringworm *Hukwakwa*	Bark	Ash ointment with medication prepared by burning the dried part.	External
		Snake bite Snake spits	Roots	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
51	*Mupembere* Tree	Coughs Colds	Leaves	Cigarette smoking of leaves	Inhalation
		Teeth	Leaves	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
52	*Mupfura* Tree	Vaginal truck reduction	Bark	Insertion of fresh barks through the vagina	Insertion
53	*Mupfuti* Tree	Ear	Leaves	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
		Snake bite Snake spits	Leaves	Rubbing a ball of leaves prepared from squeezing	External
54	*Mupondo* Tree	Snake bite Snake spits	Leaves	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
55	*Mupopo* Tree	Teeth	Leaves	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
56	*Murapazvose* Herb	Appetiser Curettage STI	Roots Tuber	Drinking hot water infused medication	Oral

57	*Muremberembe* Tree	Back (aphrodisiac)	Roots	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
		Bilharzia	Roots	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
			Pods	Eating porridge mixed with powder prepared from dried pods.	Oral
		Cancer (all types)		Eating porridge made from medicated water prepared by cold infusion of crushed roots	Oral
		Diarrhoea	Roots	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
		Snake bite Snake spits	Bark	Drinking medicine prepared by cold infusion of crushed plant part	Oral
		Stomach pain	Roots Bark Fibre	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
58	*Murima* Shrub	Wounds	Roots	Drinking medicine prepared by cold infusion of crushed flowers	Oral
59	*Muriranyenze* Tree	Chest pains	Roots	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
60	*Muroro* Tree	STI	Roots	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
		Snake bite Snake spits	Leaves	Drinking medicine prepared by cold infusion of crushed plant part	
61	*Murumanyama** Tree	Wounds	Roots	Sprinkling of powder prepared from dried roots.	External
		Headache	Leaves	Chewing fresh part and swallowing juice	Oral
		Stomach pain	Bark	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
62	*Musasa* Tree	Headache	Bark	Drinking medicine prepared by cold infusion of crushed plant part.	Oral
		Ringworm		Ash ointment with medication prepared by burning the dried part.	External
		Stomach pain	Bark Fibre	Drinking medicine prepared by cold infusion of crushed part	Oral
63	*Mushamba* Tree	Coughs Colds	Fibre	Chewing fibre and swallowing juice	Oral
		Stomach pain	Fibre Bark	Drinking medicine prepared by cold infusion of crushed part	Oral
		Wounds	Fibre	Tying affected part with fibre	External
64	*Musikavakadzi* Tree	Chest pains	Roots	Drinking medicine prepared by cold infusion of crushed roots.	Oral
			Leaves	Rubbing a ball of leaves prepared from squeezing	External
		Stomach pain	Bark Leaves Roots	Drinking medicine prepared by cold infusion of crushed plant part.	Oral

65	*Musoriondo* Tree	Cancer (all types)	Roots	Eating porridge made from medicated water prepared by cold infusion of crushed roots	Oral
		Snake bite/spites	Leaves	Drinking medicine prepared by cold infusion of crushed leaves	Oral
		Vomiting	Leaves		
66	*Musosoti* Tree	Birth control	Roots	Drinking medicine prepared by cold infusion of crushed roots	Oral
		Pneumonia	Roots	Drinking medicine prepared by cold infusion of crushed roots	Oral
		Snake bite/spits	Roots	Sprinkling of powder prepared from dried roots.	External
		Wounds	Roots	Sprinkling of powder prepared from dried roots.	External
67	*Musuma* Tree	Chest pains (heart related)	Roots	Drinking medicine prepared by cold infusion of crushed flowers	Oral
		Whole body	Roots	Drinking medicine prepared by cold infusion of crushed flowers	External
		Ringworm	Fruits sap	Smearing sap of unripe fruit onto the affected area	External
68	*Musvisvinwa* Tree	Birth canal dilation	Roots	Drinking medicine prepared by cold infusion of crushed flowers	Oral
69	*Musvodzmbudzi* Shrub	Chest pains	Roots	Mouth smoking or nasal snuffing of powder prepared from dried part	Inhalation
70	*Mutamba* Tree	Diarrhoea	Roots	Drinking medicine prepared by cold infusion of crushed flowers	Oral
		Eye	Leaves	Washing with cold infused medicated water	External
		STI	Roots	Drinking medicine prepared by cold infusion of crushed flowers	Oral
		Stomach pain	Roots Bark	Drinking medicine prepared by cold infusion of crushed flowers	Oral
71	*Mutarara* Tree	Fertility booster (woman)	Seeds	Drinking medicine prepared by cold infusion of crushed flowers	Oral
72	*Mutiti* Tree	Back pain	Roots	Drinking medicine prepared by cold infusion of crushed flowers	Oral
		Wounds	Roots	Drinking medicine prepared by cold infusion of crushed flowers	Oral
73	*Munzungu* Tree	Foaming (*gaswa)*	Roots	Drinking medicine prepared by cold infusion of crushed flowers	Oral
74	*Mutorashanga* Tree	Eye	Roots	Dropping medicine prepared by crushing leaving and soaking them into the affected eye	Drop
		Headache	Leaves	Chewing fresh part and swallowing juice	Oral
			Roots	Drinking medicine prepared by cold infusion of crushed flowers	Oral
75	*Mutsambatsi* Shrub	STI	Roots	Drinking medicine prepared by cold infusion of crushed flowers	Oral
76	*Mutukutu* Tree	Coughs/Colds	Barks Leaves Roots	Drinking medicine prepared by cold infusion of crushed flowers	Oral

77	*Mutungahove* Tree	Menorrhagia	Leaves	Drinking medicine prepared from hot infusion of crushed fresh leaves	
78	*Mutsatsati* Tree	Hives/urticaria	Bark	Washing affected parts with cold infused medicated water	External
79	*Mutsonzowa* Tree	After burial	Branches	Washing hands and face with cold infused medicated water	External
		Eye	Leaves	Dropping medicine prepared by crushing leaving and soaking them into the affected eye	Drop
			Bark	Washing with cold infused medicated water	External
		Snake bite Snake spits	Leaves	Drinking medicine prepared by cold infusion of crushed flowers	Oral
80	*Mutsubvu* Tree	Coughs Colds	Leaves	Cigarette smoking of leaves	Inhalation
81	*Mutsvairo* Grass	Asthma/chest pains	Leaf	Eating porridge sprinkled with powder prepared from dried leaves.	Oral
82	*Mutsvamzva* Tree	Bilharzia	Roots	Drinking hot water infused medication	Oral
83	*Mutukutu* Tree	Teeth	Leaves	Drinking medicine prepared by cold infusion of crushed flowers	Oral
		Vomiting	Fibre	Chewing fresh part and swallowing juice	Oral
		Snake bite Spits	Leaves	Rubbing a ball of leaves prepared from squeezing	External
84	*Mutuna* Tree	Diarrhoea	Bark	Drinking medicine prepared by cold infusion of crushed flowers	Oral
85	*Muunga* Tree	Nose bleeding	Roots	Mouth smoking or nasal snuffing of powder prepared from dried part	Inhalation
		Kuvirika diarrhoea	Roots	Drinking medicine prepared by cold infusion of crushed flowers	Oral
86	*Muvanga* Tree	Haemorrhoids	Mushroom		Inhalation
87	*Muwore* Tree	Cancer (all types) Coughs/colds	Roots	Drinking medicine prepared by cold infusion of crushed flowers	Oral
88	*Nyokarutombo* Tree	Snake bite/spits	Bark	Incision with powder prepared from dried part.	External
		Stomach pain	Roots Leaves	Drinking medicine prepared by cold infusion of crushed flowers	Oral
89	*Onyeni* Vegetable	Ear	Leaves	Drinking medicine prepared by cold infusion of crushed flowers	Oral
90	*Ruvavashuro* Grass	Female infertility	Seeds		
91	*Sweet potato* Vegetable	Wounds	Root	Smearing root powder and dirty rug charcoal on the wound	External

92	*Tsangamidzi* Herb	Headache Neck pain Sore throat Stomach pain Constipation	Root	Drinking hot water infused medication Necklacing roots Mhm Chewing fresh part and swallowing juice	Oral External Mouthing Oral
93	*Zanadakubaya* * Herb	Cancer	Root	Eating porridge made from medicated water prepared by cold infusion of crushed roots Drinking medicine prepared by cold infusion of crushed flowers Sprinkling powder prepared from dried roots	Oral Oral External
94	*Zumbani* Herb	Blood pressure Coughs/colds Warts	Leaves Leaf sap	Drinking hot water infused medication Squeeze on the affected parts	Oral External


Chisingaperi chinoshura.
The End
All things come to an end