# Indigenous knowledge and Environmental Education: A case study of selected schools in Namibia

BY

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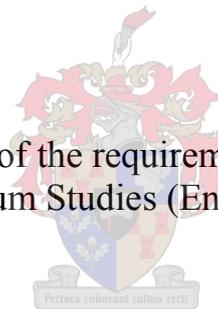
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Declaration

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Abstract

In some contemporary discourses, a new dimension of knowledge is increasingly being recognised. Sustainable development is no longer the exclusive domain of western science and technology. There is a growing interest in the role that indigenous people and their communities can play in sustainable development. The integration of indigenous knowledge (IK) into formal school curricula, especially environmental education (EE), is seen as a key approach to making education relevant to rural students. This will also promote the intellectual diversity required to manage the scope, complexity and uncertainty of local and global environmental issues.

This study is guided by constructivist approaches and postcolonial perspectives that recognise the differences between IK and western sciences but at the same time concerned with ways in which the two can work together. In particular, this study uses a qualitative case study of selected schools in the Northern part of Namibia to investigate how IK can be used to support EE in rural schools. The National (Namibian) Curriculum for Basic Education and the Life Science curriculum documents have been analysed, focusing specifically on how IK is coupled with EE at school level. The review of the curriculum documents revealed that IK is not only ignored and underutilised in schools, but also systematically undermined as a potential source of knowledge for development. The curriculum continues to reinforce western values at the expense of IK.

To gain more insight into existing EE practices in schools and the role that local knowledge can play in school syllabi, six teachers, two advisory teachers and two traditional leaders were carefully selected and interviewed. The basis for this was to possibly challenge and address the needs that learners and their environment have. The participants in this study embraced the inclusion of IK in EE. However, the processes of combining IK with science may be constrained by challenges related to: teachers' attitudes, the design of the curriculum, and the way learner-centered education is conceptualised and practiced in schools. The study suggests that, to incorporate IK into EE effectively may require a shift away from the current strong subject-based, content-focused and examination driven EE curriculum. A cross-cultural Science Technology and Society (STS) curricula that includes a broad range of disciplines and provides a context within which all knowledge systems can be equitably compared and contribute to our understanding of the environment is proposed as an alternative curricula framework.

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Contents

List of acronyms used

BETD   Basic Education Teacher Diploma

CITES   Convention on the International Trade of Endangered Species

DRFN   Desert Research Foundation of Namibia

EE   Environmental Education

EEASA   Environmental Education Association of Southern Africa

EEFSD   Environmental Education 'for' Sustainable Development

ESD   Education for Sustainable Development

HoD   Head of Department

HSRC   Human Sciences Research Council

ICAD   International Council of Adult Education

IGCSE   International General Certificate of Secondary Education

IK   Indigenous Knowledge

ILO   International Labour Organisation

LCE   Learner-centred education

MEC   Ministry of Education and Culture

MET   Ministry of Environment and Tourism

MFMR   Ministry of Fisheries and Marine Resources

MoE   Ministry of Education

NEEN   Namibia Environmental Education Network

NEN   Namibia Environmental Network

NIED   National Institute for Educational Development

NSSCO/H   Namibia Senior Secondary Certificate Ordinary/Higher

OBE   Outcomes-Based Education

SADC-REEP   South African Development Community-Regional Environmental Education Programme

SB   School Board

SDP   School Development Plan

SEEN   Support Environmental Education issues in Namibia

STS   Science-Technology-Society

TFK   Traditional Ecological Knowledge

UN DESD   United Nation Decade on Environmental Education

UN   United Nations

UNCBD   United Nations Convention on Biological Diversity

UNCED   United Nations Conference on Environment and Development

UNCED   United Nations Conference on Environmental Education

UNESCO   United Nations Educational, Scientific and Cultural Organization

UTA   Uukwambi Traditional Authority

WMS   Western Modern Science

Chapter 1

1.1 Introduction

This chapter provides a brief overview of the study. The first section provides a brief motivation and background of the study, focusing exclusively on some of the important international and local developments with regard to environmental education and the role of indigenous knowledge in relation to sustainable development. In the second section, the chapter proceeds with the problem statement and the research questions guiding this study. The overview of the research methodology including data gathering, case selection, the scope of the research and methods of establishing trustworthiness and ethical procedures that are employed to accomplish the aim of this research have been provided. This is followed by the significance of the study and its limitations. The final part of the chapter gives the overview of how the thesis is arranged.

1.2 Motivation for the study

Environmental conditions on earth are changing rapidly. The degree to which those changes are human-induced is debatable, but the fact that changes are continuously observed is indisputable (Zietsman, 2011:5). In the past few decades environmental issues and risks have raised concerns at international and national levels with environmental education emerging as a potential response to the escalating environmental problems (Le Grange 2001:34). Although the role of educational institutions cannot be underestimated when it comes to environmental protection, capacity building and creating awareness of environmental degradation is an on-going challenge. Climate change, depletion of the stratospheric ozone layer, change in biodiversity, pollution and degradation of water, air and land are all continuing due to human negligence of the environment. This is something that calls for immediate intervention.

In the past environmental problems have been seen as scientific problems which only science and technology should solve (Gough, 2011:10). However, this idea has been challenged and the causes and solutions to environmental problems are viewed as being more complex. In some contemporary discourses, there is an increased recognition of the role that indigenous communities can play in addressing environmental problems (Ruppel & Ruppel-Schlichting,

2011:43). Indigenous knowledge (IK) as a construct of a broader society is a relatively recent phenomenon that emerged in the past two decades as part of an agenda to liberate traditional ways of knowing. According to Horsthemke (2004:32) 'indigenous knowledge' is taken to cover "local, traditional, non-western beliefs, practices, customs and worldviews, and frequently also refers to alternative, informal forms of knowledge". It has been commended as an alternative and highly effective field that supports the acquisition of environmental knowledge from indigenous people (McGregor 2004:385).

Awareness of the importance of environmental education can be traced back to at least the 1970s; perhaps the strongest voice at the time was that of the "Tbilisi Declaration which resulted from an intergovernmental conference convened by UNESCO in 1977" (Hungerford, 2009:2). However, the United Nations Conference on Environment and Development (UNCED) (1992) laid the foundation and provided major indicators for the incorporation of indigenous knowledge in an effort to respond to environmental issues and risks (Hungerford, 2009:2). The UNCED adopted a blueprint for sustainable development referred to as Agenda 21. Agenda 21 is a global consensus document which covers issues associated with indigenous knowledge (IK) in two chapters: Chapter 26 and Chapter 36. Chapter 26 promotes the recognition and strengthening of the role of indigenous people and their communities in promoting sustainable development, while Chapter 36 addresses the promotion of environmental education, the importance of public awareness and training (UNCED 1992).

Namibia is also confronted by environmental issues and risks that are experienced by other countries. During a comprehensive assessment of environmental threats and opportunities in Namibia, Byers, (1997:ix) identifies the key proximate causes of environmental problems and risks as the following: overexploitation of water resources, overgrazing and unsustainable range management, lack of adequate protection of some key ecosystems and overexploitation of marine fish stocks. As custodian of finite natural resources, the Namibian government has therefore given a high priority to environmental concerns by signing international agreements such as the United Nations Convention on Biological Diversity (UNCBD) and the Convention on the International Trade of Endangered Species (CITES) (Ruppel & Ruppel-Schlichting, 2011:28), passing laws and developing national policies (Environmental Management Act, 2007), implementing management strategies and raising awareness through education.

Environmental Education (EE) has been identified as an integral part of achieving an environmentally literate nation. The Ministry of Education and Culture (MEC) now the Ministry of Education (MoE) and the Ministry of Environment and Tourism (MET) have made a substantial commitment to environmental education. Within the basic education curriculum, environmental concerns are incorporated from grades one (age 7) to seven (age 13) and are strongly reinforced in the new Life Science Curriculum for grades eight (age 14) to ten (age 16) (Monroe, 1994:7). In senior secondary education (grades 11-12, age 17-18) which is not mandatory, Namibia has extended the environmental education themes by using Natural Economy, Agriculture, Biology and Geography as "carrier subjects" (Monroe 1994:7). However, little is done to include the knowledge of the different indigenous groups into the school system, with the exception of languages, where at least one paper on indigenous languages is included (Jorgen, 2011:89).

1.3   Description of the problem

Namibia's primary and secondary schools have a western bias (Jorgen, 2011:89), perhaps because of its long association with South Africa. Because of this bias, Nekhwevha (1999:504) argues that Namibian education has the potential of excluding the cultural knowledge and experience of the African people and fostering what Freire (1970:12) called the "culture of silence". This means that western knowledge, values and norms dominate indigenous knowledges (IK) and in so doing largely silencing indigenous people. The school curriculum is contaminated with Western bias which alienates rather than opening up an appreciation of how indigenous knowledge can work together with western epistemologies so as to better manage resources in a more sustainable way. Moreover, as a result of the western bias in schools, environmental education in Namibia currently tends to have an urban slant and may thus be inappropriate for the rural students.

The nexus between EE and indigenous knowledge is rarely a focus of attention in classrooms though teachers are required to contextualize their lessons and instructions. Simalumba (2011:130) argues that indigenous knowledge is not being integrated into the daily teaching of environmental issues in schools in the Caprivi Region of Namibia in particular. The transfer of indigenous knowledge from everyday life to the school curriculum is not always valued or encouraged and indigenous ways of knowing are underutilised by teachers (Semali, 1999:305).

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As a consequence of the dominance of Western science, many children may have lost many of the bush skills that have been handed down through the generations using a rich oral history and various rituals which brought old and young together to exchange this knowledge.

However, the recognition of indigenous knowledge for example, could enrich the current environmental education programme and complement the strong subject-based focus of the empirical sciences (Botma, 2000:23) which characterises Namibia's current education system. This is because there are various forms of indigenous, traditional learnings provided by families and by communal groups. These forms of learning often play an important role in rural communities and help shape people's understanding of their social and natural environment. Thus, this study was aimed at exploring how indigenous knowledge can support environmental education in two selected schools in the Omusati region in the northern part of Namibian. The main research question for this study is**:** How can indigenous knowledge be used to support Environmental Education in Namibia's rural schools?

To answer the above research question the following sub-questions will also be asked:

- What are the views of teachers, subject advisors and the traditional leaders about how IK can be used to support EE?

- What are the opportunities and challenges of achieving the integration of IK and EE?

- How can IK be mobilised to enhance environmental learning within the school curriculum?

1.4   Research methodology

In order to answer the research questions posed above, this study takes the form of a qualitative case study as a means to produce and analyse data. A case study is "an exploration of a 'bounded system' or a case (or multiple cases) over time through detailed, in-depth data collection involving multiple sources of information rich in context" (Creswell, 1998:61). Yin (2009:19) added that a case study is appropriate when investigating a contemporary phenomenon in depth and within its real life context. The phenomenon that is being studied here is the support that EE can get from IK. Taking into account that IK is (a) dynamic and continually influenced by

internal creativity and experimentation as well as by people in contact with external systems (von Liebenstein, 2000:7), and (b) the fact that the IK and EE integration discourse is a contemporary phenomenon, a case study approach is therefore warranted.

In particular, the envisaged research utilises two methods of collecting data for this case study, namely: documentary analysis and interviews. The national curriculum documents was analysed in relation to EE in order to prepare appropriate interview questions. Four (4) teachers, two from each school, two (2) advisory teacher and two (2) senior traditional leaders from one of the school's community were selected for the study to be interviewed. In this regard, triangulation is utilized by using multiple methods of data production and data sources.

The interviews were semi structured with open- ended questions aimed at determineing the teachers', advisory teacher's and traditional leader's views (Question 1), establishing challenges and opportunities (Question 2) and identifying alternatives for achieving EE and IK integration (Question 3). These generated considerable information and took into account a range of geographical, climatic, historical and cultural factors that an interviewer may not be aware of. All the interviews were recorded after permission was given. Once the interviews were recorded, they were transcribed as soon as possible after the visit. In the case of traditional leaders who were interviewed in the local language, a Brislin's (1986:137) forward–backward translation procedure was used. The data from interviews was processed and analysed using Braun and Clarke's (2006: 81) step-by-step guide of conducting thematic analysis.

1.5   Scope of the research

This study only focuses on how IK can support EE in rural schools. The educators and traditional leaders that participated in this study were from rural schools in the Omusati Region. It was perceived that most traditional societies, many of them in rural areas, have nurtured and protected systems of knowledge of their own, relating to diverse domains (von Liebenstein, 2000:2) which include environmental management. The research questions given above served as a guideline that determined the content that was covered.

1.6   Selection of cases

Purposive sampling, done using a judgment sample was used. According to Sharan (1988:48) purposive sampling "is based on the assumption that one wants to discover, understand, gain insight; therefore one needs to select a sample from which one can learn the most". The researcher actively selects the most productive sample to answer the research questions. In this regard, schools selected for this study are from rural areas because IK is more prevalent in rural communities compared to urban communities. In addition, the schools offer Life Science at the junior secondary phase (8-10).

The general criteria that were used in selecting the teacher participants included willingness to participate, being trained as a Life Science teachers and the ability to express themselves without fear. Advisory teachers are the main source of professional support including EE support and they are also involved in curriculum development at regional and national levels, thus their inclusion is vital. Traditional leaders were selected on the following merits: that they have the constitutional right to safeguard, uphold and preserve culture, language, tradition and the value of their community and at the same time ensure that natural resources are used in sustainable ways (Section 3 (3) (c), Traditional Authorities Act, No. 25 of 2000.).

1.7   Ethical considerations

According to Remenyi, Swan, and Van Den Assem (2011:1), ethics deals with issues of human conduct allied to a sense of what is right and what is wrong and thus it may be viewed as society's code of moral conduct. Ethical issues arise in all aspects of research, and the research methods proposed here also face ethical requirements. Therefore, this proposal was submitted to the University of Stellenbosch's ethical committee for ethical clearance. In addition, a letter was written to regional education director and to the principals of schools selected for this study, requesting permission to conduct this research at their schools (see Appendix I). Interviews and observations were done only after informed consent was given by interviewees (see Appendix D). Moreover, anonymity of data and confidentiality was guaranteed and participants were allowed to withdraw from the research at any stage if they felt uncomfortable.

1.8   Significance of the Study

A review of the available literature and Namibian curriculum documents has shown that indigenous worldviews are systematically undermined and largely absent from the school curriculum and environmental education in particular. It is hoped that the outcome of this research will enable policy makers, curriculum advisors, administrators, teachers, learners, parents and the community at large to acknowledge, respect and promote the potential benefits of using indigenous knowledge to teach science and environmental education. This will eventually help them to gain insight and rethink the current education praxis by making successful interventions. This will allow basic education to be more relevant to rural society. Furthermore, the insights, views, debates theories and curriculum models presented in this study might help teachers revisit their teaching strategies and adopt approaches that will in turn help students to cross cultural borders and surmount barriers that stand between indigenous knowledge and Western science (Shizha, 200:9). The integration of indigenous worldviews into mainstream education provides rural society with the opportunity to develop awareness about the valuable contribution of their traditional knowledge practices in sustaining their livelihood. Finally, the relationship between indigenous knowledge and science education is a poorly researched area in Namibia. Therefore, this study would also serve as a source of reference for those who wish to carry out research into similar issues about making education relevant to learners and parents that exist at the margin of development. A cross-cultural Science Technology and Society (STS) curriculum model proposed in this study has been accepted or rejected, in whole or in part, by various science educators. However, if we are serious about raising environmental awareness among rural students and increasing their achievement and participation in science related courses, while maintaining their cultural identities, it is better that we evoke a debate about the nature of science and the relevancy of integrating indigenous knowledge into (science) education in general. If there is no debate there is no progress (Waiti and Hipkins, 2002:2006).

1.9   The structure of the thesis

Chapter one: This chapter serves briefly to introduce the readers to the 'what' and 'why' of the study. It provides the motivation and background to the study. The research problem, research questions, research methodology, research scope, ethical considerations, possible significance of carrying out this study and the outline of chapters to follow are presented.

Chapter two: This chapter embraces a review of literature pertinent to the relationship between environmental education and indigenous knowledge, starting from an international perspective and narrowing it down to a regional (Southern Africa) and more specifically, Namibian context. The conceptual and theoretical frameworks guiding the operations of this study and debates related to indigenous knowledge and science education are discussed. It reviews some of the local initiatives that have been taken in Southern Africa which focus on the importance of indigenous knowledge in environment-related fields. A snapshot of the situation prevailing in Namibia, which traces demographic, historical, political and social developments that have taken place since 1990 and that have led to the present curriculum, is discussed.

Chapter three: This chapter deals with the research methodology, the procedures and the strategies used in the study. The discussions in this chapter include the research paradigm or philosophical framework that has been adopted, the design of the study, selection of cases, methods of gathering data, analytical strategies and methods of establishing trustworthiness and ethical procedures that were employed to accomplish the aim of this research.

Chapter four: This chapter presents an analysis, description and interpretation of the results. Firstly, the chapter starts off by providing a detailed account of the historical, social and cultural context with which the teachers and students concerned interactwith when teaching and learning about their environment. The second part of the chapter focuses on the presentation and on the analysis of data, in line with the research question(s). The data is organised and presented in five main categories.

Chapter five: This chapter outlines the findings of the preceding chapters and offers conclusions. The main findings are discussed in detail and recommendations based on the analysis which emerged from the research are presented.

Chapter 2

Literature review

2.1   Introduction

In Western scientific knowledge, a literature review is a process that is aimed at critically analysing a segment of published themes. In this chapter, a review of literature on indigenous knowledge (IK) and environmental education (EE) is undertaken to provide background to, and justification for, the study and to generate relevant theories accordingly. According to Briggs and Coleman (2007:62), the obvious reason for conducting a literature review is to help clarify what is already known, and what has been done so far to prevent duplication. The main focus of this literature review will be on the development of EE since the first UN Conference of the Human Environment was held in Stockholm in 1972 and the relationship of EE with IK.

The current chapter explores the relationship between EE and IK, starting from a global perspective, and narrowing it down to a regional (Southern Africa) and, more specifically, a Namibian context. The chapter begins by clarifying two major concepts: EE and Education for Sustainable Development (ESD). The chapter investigates both international and local historical developments that have played a pivotal role in shaping and promoting research on EE, as well as its association with IK. Moreover, it reviews some of the conceptual and theoretical frameworks that are used in defining the terms 'indigenous people' and 'knowledge', so as to arrive at a better conception of the term 'indigenous knowledge' and considers how best the newly formulated IK can be integrated into EE processes. The chapter goes further to discuss why IK has become a leading concept in EE discourse. Since most environmental learning takes place in science classrooms, it is also deemed necessary to discuss the 'IK versus science' debate.

The final part of the chapter briefly covers Namibia's demographic, political and educational development since 1990, leading to the development of its current EE policy. Moreover, an analysis of the National (Namibia) Curriculum for Basic Education and Life Science curriculum documents was undertaken, focusing exclusively on how IK is coupled with EE in terms of such curricula. The chapter further goes on to explore how indigenous languages have been

marginalised, and how this has impacted on environmental learning and on the national dream of sustainability.

Marie Battiste's (2002) commentary on the effectiveness of conducting a literature review on the IK is worth noting. Battiste (2002:1) argues that the problem of conducting a review of literature on IK implies that the Western approach to research can reveal the nature of, and can lead to an understanding of, IK. However, IK does not reflect the classic Western order of life. According to Battiste (2002:1), "it is a knowledge system in its own right with its own internal consistency and ways of knowing, and there are limits to how far it can be comprehended" from a Western point of view. This does not mean that a literature on IK and EE is not possible, but it does point out the limitations of such a review. Such limitations are also captured in the World Bank paper titled *Indigenous knowledge for development: A framework for action*, prepared by Woytek and Gorjestani (1998). The paper (Woytek & Gorjestani, 1998:2) states:

> [I]ndigenous technologies, practices, and knowledge systems have been studied extensively by sector specialists and even more so by social anthropologists. However, most studies are descriptive; they concentrate primarily on the social or ethnological aspects of knowledge rather than on the technical ones.

Moreover, the existing literature contains limited information regarding the systematic transfer of Namibian local rural environmental management practices and indigenous environmental knowledge across communities and cultures.

2.2   Environmental education and education for sustainable development

The descriptions of the terms 'environmental education' and 'education for sustainable development' are inconsistent in the literature, leading to possible uncertainty and confusion. The quandary that is caused thereby leaves one wondering whether EE and ESD are one and the same thing, or whether perhaps EE is being replaced by ESD. In order to address the dilemma, it is, firstly, necessary to address and to clarify the broad concept of ESD, and how it relates to EE. Such an address can, at least initially, take the form of an examination of the origin and development of ESD, together with a tracing of the difficulties that are involved in obtaining a consensus of opinion in the field of EE.

According to Sauvé (1996:18), the relationship between EE and ESD can be perceived in different ways. Some people see sustainable development as the ultimate goal of EE, leading to them, thus, adopting the term *environmental education 'for' sustainable development* (EEFSD). Others think that sustainable development serves different objectives, which should accompany those of EE, and, thus, use the expression *education for environment 'and' sustainable development.* For others still, the term 'environmental education' implicitly includes education *for sustainable development*, and that it is no use to change the terminology concerned.

Sustainable development, which is a term that originated in German forestry management practice during the 18th century, has been defined by the Brundtland Commission (1987) as: "a development which meets the needs of the present without compromising the ability of the future generation to meet their needs" (Le Grange, 2008:207). The Brundtland Commission adopted the term because the resolutions that were taken at the Stockholm 1972 UN conference were inadequate in addressing the needs of the developing world. According to Le Grange (2008:210), EE's association with sustainability has its roots in the tension existing between conservation needs and developmental needs. Although 'sustainability' / 'sustainable development' is a highly contested term, the concept has been established as the central goal for EE. To be more specific, the holding of the Earth Summit that took place in Rio de Janeiro in 1992, and the hosting of the recent World Summit on Sustainable Development in Johannesburg, South Africa in 2002 both signalled the introduction of sustainable discourse, as well as of ESD, into school curricula throughout the world (Le Grange, 2008:207; Kopnina, 2012:703).

Consequently, ESD has come to dominate educational discourses, and one can agree with many practitioners (Sauvé, 1996:7; Le Grange, 2008:211) that sustainable development is a dominant goal of EE. Thus, sustainable development appears to be a sub-movement within EE. In support of the above thinking, Sauvé (1996:8) argues that the principles of EE, as set forth in the Tbilissi Declaration, embrace the fundamental elements of sustainable development: the need to consider social aspects of the environment and to take into account the close links between the economy, the environment and development; the adoption of both local and global perspectives; and the promotion of international solidarity, among others.

Admittedly, some contradictory views also exist, as far as the relationship between EE and ESD is concerned. For instance, McKeown and Hopkins (2003:117) argue that ESD is not likely to replace EE, but that it is one of its goals –however, "it is not the only goal". The two identified researchers see ESD as being the bigger umbrella under which EE fits. Though they acknowledge that EE and ESD influences and complement each other, they see the two concepts as being discrete. McKeown and Hopkins (2003:117) assert that "[i]t is important that EE and ESD maintain separate agendas, priorities, and programmatic development". In contrast, Bob Jickling, in his article entitled "Why I don't want my children to be educated for sustainable development", questions the conceptual and ethical foundations of educating children for sustainability. Jackling is sceptical when it comes to why people need to develop sustainably. He (as cited in Sauvé, 1996:9) argues: "Education is concerned with enabling people to think for themselves. Education 'for' sustainable development ... or education 'for' anything else is inconsistent with this criterion."

Certainly, the spectrums of contentions are diverse, with, not surprisingly, most coming from Western culture that divorces humans from nature. In other words, teaching for sustainable development, in terms of Western culture, would seem to contradict the ultimate goal of education, "I think, therefore I am", which is merely a concern with the students' optimal development and autonomy. Whether such would be the same in terms of the African philosophy of ubuntu – meaning "I am because we are" or "a person is a person through other persons" is questionable. On the contrary, ubuntu helps the individual not only to think and care for self, but also to appreciate that to be human means having a responsibility toward others (including future generations) and nature. Le Grange (2012:10) writes: "[T]he self is inextricably bound up in relations with the other and the biophysical world".

Yet, thinking that ubuntu is the ideal framework within which to position educating for sustainability might be problematic. Different educations are designed to serve different purposes and purposes vary with different audiences, different needs and different contexts. Thus, even if the principle of ubuntu were to be adopted, the problem of what is meant by 'educating for sustainability' would remain unsolved. Neither Western culture nor African philosophy would solve the issue of sustainable development, and how it is reflected in discourses on EE. The alternative is to consider Le Grange's (2008:212) and Sauvé's (1996:28) suggestion that diversity

in EE needs to be acknowledged as a stimulus for "critical reflection, discussion, contestation and evolution". In other words, diversity and multiple perspectives on ESD should not be perceived as problematic, but as a "classification process aimed at helping educators" (Sauvé, 1996:7) in developing informed EE theory.

Finally, one needs to appreciate that the relationship between EE and ESD is a complex one, which is embedded in people's own beliefs and interests, school of thoughts, or context. However, the ultimate goal of the two interrelated dimensions of contemporary education is the development of responsible societies that not only care for self, but which also has a responsibility toward future generations. The terms, 'environmental education' and 'education for sustainable development', will, therefore, be used interchangeably in the current thesis, because they serve similar fundamental goals. They will be operationally grouped together under major concern of safeguarding and caring for the environment, nature and people.

2.3   The rise of international and local awareness: environmental education

EE began in the 1960s, in response to concern in the international community that was raised about environment conditions and crises (Thompson, 1997:3). The subject originated in the field of nature and conservation studies, with it originally being conceived as a form of science education regarding the environment (Marouli, 2002:26). Due to growing concerns about environmental degradation and the consequent decreasing quality of life expressed by scientists in the 1960s (Gough, 2002:1201), the conservation movement introduced a concern for the preservation of species and of areas of natural significance, through sound management.

According to Thompson (1997:3), the primary purpose of the nature and conservation movement was, and still is, to develop an understanding and appreciation of the natural environment through first-hand observations. However, such an approach has been unsuccessful, as the observations concerned have been based on narrow perspectives of research, communication and even the nature of environmental problems (Thompson, 1997:3). In short, the nature and conservation movement focuses too narrowly on the protection of the natural environments (for reason of their ecological, economic or aesthetic values), without taking into account the needs and rights of the human populations that are associated with the same environments, as an integral part of the ecosystem (Sauvé, 1996:8). Gough (2002:1201) states that conservation has

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often been concerned with stimulating a sense of individual responsibility for the physical and the aesthetic quality of the total environment, thus rendering it inadequate for achieving the aims of EE, and for meeting the current challenges.

Currently, EE no longer carries a conservation connotation. During the last two decades, several attempts have been made to (re)define such education, particularly due to the increased number and complexity of environmental problems that are currently facing the Earth. This is evident in the number of publications that are being published, and the number of international and local conferences that are taking place around the world. However, defining the concept of 'environmental education', and coming up with a globally acceptable definition of the term is an ongoing challenge. Most descriptions that individuals tend to attach to their definitions are influenced by their experiences, as well as by other perspectives, such as those that are supplied by world conferences, individual experiences, and environmental risks and issues that such education attempts to solve.

The Belgrade Charter (UNESCO -UNEP 1975:3), which provides a widely accepted goal statement for EE, states:

> The goal of environmental education is to develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones.

The said goal statement potentially broadens the focus of EE pedagogical approaches to not only consider immediate environmental improvement as an actual goal, but to also address educating for sustainability in the long term. However, the statement does not pay particular attention to IK. Two years later, building on the Belgrade Charter, the Tbilisi Declaration (1977) made the far-reaching recommendation that EE should be a lifelong learning, and an integrated active and inclusive, process (Education, 2008a:1). Apart from the above recommendations, the Tbilisi Declaration has established goals, objectives, criteria, and principles for the implementation of EE. UNESCO, in the Tbilisi Declaration defines EE as a:

> learning process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and

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fosters attitudes, motivations, and commitments to make informed decisions and take responsible action.

(UNESCO, 1978:8)

The principles prioritise perspectives that advocate the recognition of culture and history in addressing today's critical environmental problems (O'Donoghue & Neluvhalani, 2002:121). They also acknowledge learners' diverse socio-cultural backgrounds, (including their knowledge systems and language) and historical contexts, and clearly state that EE ought to adopt a holistic approach; it ought to be interdisciplinary, aiming for problem-solving, and for addressing community problems and needs.

Since the Tbilisi Declaration, proliferations of events both internationally and around the Southern African region that focuses on IK have been observed. The said events include the World Commission on Environment and Development of 1987, which recommended that indigenous are "repositories of accumulations of traditional knowledge and experience" (O'Donoghue & Neluvhalani, 2002:121), the proclamation of 1993 as "the year for indigenous people" (Le Grange, 2001:72), the holding of the 1st Global Knowledge for Development Conference (GK'97), and the publication of the 1998 World Development Report on Knowledge for Development (Von Liebenstein, 2000:2), among others. The ultimate objectives of these events and declarations were/are to strengthen the spirit of international cooperation and to search for solutions to the problems that are faced by indigenous people in the field of human rights, the environment, development, education, and health. The issues of diversity, and especially biodiversity, and the role of indigenous communities in the protection of, and the utilisation of natural products in their surroundings were elucidated during the 1992 United Nations Conference on Environmental Education (UNCED) that was held in Rio de Janeiro, Brazil (Odora Hoppers, 2002:3).

During the 1992 United Nations (UN) Rio Declaration on the Environment and Development, both developed and developing countries around the world created an international agreement to encourage states to respect and to protect global environmental integrity (Banavage, 2008:1). A blueprint for sustainable development, which was referred to as Agenda 21, was adopted, which covers issues associated with IK in two chapters, namely Chapters 26 and 36. Chapter 26

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promotes the recognition and the strengthening of the role of indigenous people and their communities in promoting sustainable development, whereas Chapter 36 focuses on the promotion of education, public awareness, and training for the environment. Working within the Southern African region, O'Donoghue and Neluvhalani (2002:121) have examined documents regarding emerging methods and methodological perspective aimed at mobilising IK in, and for, environmental learning in schools. As is the case with Masuku Van Damme and Neluvhalani (2004:155), O'Donoghue and Neluvhalani (2002:121) argue that principles 7 and 9 that were adopted by the international NGO at the Rio Earth Summit, were the mobilising agent in developing the work that was undertaken by EE practitioners and IK researchers.

Therefore, the Rio Summit outcome expounded the view that IK has played a positive role in development, and in response to environmental issues and risks (Masuku Van Damme & Neluvhalani, 2004:155). The outcome is deemed to be instrumental in dispelling past negative perceptions regarding IK, replacing them with due regard for those IK role-players who play a purposeful and pivotal role in sustainable development processes. The recommendations of the aforesaid Summit are the reason why the international community and organisations within the fields of conservation and education currently respect IK.

The last declaration to emerge from the outcome of the 4th International Conference on Environmental Education, which was held in Ahmedabad, India in 2007, within the framework of the UN Decade on Environmental Education (UN DESD), marking the elapse of 30 years since Tbilisi, provides a clear sense of the vision of EE in terms of several areas of thinking and practice:

> Our vision is a world in which our work and lifestyles contribute to the well-being of all life on Earth. We believe that through education, human lifestyles can be achieved that support ecological integrity, economic and social justice, sustainable livelihoods and respect for all life.
>
> (Education, 2008a:87)

Those who attended the above-mentioned conference reached a consensus that, through education, "we can learn to prevent and resolve conflicts, respect cultural diversity, create a caring society and live in peace" (Education, 2008b:10). The participants of this conference value traditional wisdom and IK for the potential contribution that it can make to the rethinking

of practices and opportunities for education sustainability (Education, 2008b:10). The diversity of knowledge systems is encouraged as being legitimate within the educational process, with the assumption that many of the existing problems and solutions could be inherent in the knowledge systems that are applied by the community. The importance of partnership and the collaboration of different stakeholders in social work has been re-emphasised, as can be seen below:

> We can learn from indigenous and traditional patterns of living that respect and honour the Earth and its life-support systems and we can adapt this wisdom to our fast changing world. We can make individual, community, national and even global choices with due consideration for the collective good. Individuals including youth, civil society, governments, businesses, funding partners and other institutions can appreciate that their daily actions can shape a viable future of which all can be proud.
>
> (Education, 2008a:87)

Due to the above, the definition, the principles, the operational framework, and the viewpoint of promoting and developing EE in Namibia should be seen within the vision that was set forth by the 4th International Conference on Environmental Education. Said vision should serve as a guideline on how the EE and its sub-movement ESD have been defined and understood.

In conclusion, the conferences and declarations discussed above reflect the desire and the attempt to respond to international frameworks on education and development. They promote EE processes that are aimed at supporting and championing ESD. Most innovations that have occurred in the field of EE have been due to changing concerns about the environment and its related problems, and the way in which EE has been defined and promoted. The influences of the ecological movement and the social and political dimensions of environmental problems have also been identified as being necessary in terms of EE (Marouli, 2002:26). Partnerships and IK have been identified as an alternative solution for a deteriorating environment.

A question to ask is: what exactly is IK, or what constitutes IK? Unfortunately, there is no easy answer to the question. In the next section, an attempt will be made to define the term 'indigenous knowledge', which is first preceded by defining each element separately. Thereafter, a discussion on how different authors and researchers have conceptualised the contested term will take place.

2.4   Conceptual and theoretical issues: indigenous knowledge

Since the term 'indigenous knowledge' is going to be used throughout this study, it is necessary to discuss aspects of IK, in general, through which the linkages with EE can be discerned. To adequately address what IK is, it would be prudent, first, to deal with each element ('indigenous' and 'knowledge') separately. In the part that follows, the focus will be drawn to how the concept 'indigenous' has been formed and shaped, and how it should be adapted and made applicable to the African, but particularly Namibian, context. It continues by providing a review of the conceptual and theoretical framework, used in defining the term 'knowledge' to arrive at a better understanding of IK, and how best it can be used in terms of EE.

2.4.1. Being indigenous

The term 'indigenous', as applied to people, is a contested category (Deruyttere, 1997; Kingsbury, 1998; Denzin, Lincoln & Smith, 2008; Green, 2008). According to Semali and Kinchelo in Phiri (2008:14), 'indigenous' is an ambiguous term, with different meanings for different people. For instance, the conventional conception of what was meant by the term 'indigenous', as it was adopted during the colonial era, differs significantly from the contemporary perception of 'indigenous' as relating to some of the colonised people in the neocolonialist era.

The colonial conception of 'indigenous' was associated with such derogatory terms as 'backward', 'primitive', 'the wild', 'the ignorant', 'the natural' and 'the passive recipient of western knowledge' (Battiste, 2002:4; Phiri, 2008:14). Therefore, the term possesses historically-situated connotations in most marginalised communities, which renders the use thereof somewhat problematic. The said use tends to trigger emotions, more especially since such use is closely linked to a past history of exploitation by colonial oppressors, as well as to the marginalisation of non-dominant ethnic peoples by powers in the Western world (Zazu, 2008:17). For this reason, the use of such expressions as 'First People Canadians', 'Native People', 'First Nation', 'People of the Land', 'Aboriginal Australians', 'Fourth World People', 'Maori of New Zealand', or 'Amazonian Indians', among others, tends to be preferred.

Currently, the term 'indigenous' is used to enable the collective voice of the colonised people to be expressed strategically in the international arena. Yet, within this conception of 'indigenous',

two broad approaches may be identified (Kingsbury, 1998:414). The first approach would view 'indigenous peoples' as a category requiring precise criteria, so that, for particular operational purposes, it should be easy to determine who does, or does not, have a particular status on the basis of such criteria. For example, the International Labour Organisation (ILO) defines indigenous people as the "descendants of the original inhabitants of a geographic region prior to colonization who have maintained some or all of their linguistic, cultural and organizational characteristics" (Deruyttere, 1997:2). In the international arena, it is generally accepted that the San people (i.e. Bushmen) are indigenous to Namibia. The said people are commonly referred to 'marginalised communities' in Namibia, in order clearly to show their critical condition and the state of affairs that has resulted from their domination by other indigenous groups and the colonisers. Though no one can dispute that San people are indigenous, dismissing and excluding the majority of local people, who, because of colonisation, globalisation, migration and other economic factors, can no longer meet international criteria is unacceptable.

The second approach, which has been adopted in the current study, is more inclusive and flexible. The said approach does not define 'indigenous peoples' according to universally applicable criteria, but rather as representing a continuous process, in which claims and practices, in many specific cases, are abstracted in the international society, and then made specific again at the moment of application in the political, legal and social processes of particular cases and societies (Kingsbury, 1998:415). The approach makes a global conceptualisation of 'indigenous peoples' possible, while allowing for sufficient functional specificity to meet diverse social circumstances and institutional requirements, Kingsbury (1998:415) further argues. According to Shava (2008:2), "local/aboriginal people are indisputably indigenous on the basis that they were the original occupant of the continent prior to colonisation and in that they have no origin and ancestry other than on the continent". While the Shava definition is acceptable, not every indigenous person is an IK holder. Therefore, for the purpose of the current study, indigenous people may not always need to be the *first* inhabitants of a region, but they do have to be ***long-term*** inhabitants of a particular place, and to have an intimate understanding of the local nature/ecosystem/biodiversity (Gupta, 2006:316).

Though it is also true that most indigenous people are marginalised and are minority members of the society of which they form a part, there is no sense in claiming that the majority or the

dominant local groups have a weak claim of indigeneity. The terms 'marginalisation' and 'minority' are not synonymous with the term 'indigenous'. Therefore, a narrow view that strictly associates the quality of 'indigenousness' only with certain cultural groups, based on the socio-economic factors concerned, is, therefore, problematic. Durie (2004:1138) reminds readers that neither colonisation nor socio-economic disadvantage is considered to be the most defining element of indigeneity. Instead, a strong sense of unity with the environment is a fundamental starting point for such a definition. Thus, the criteria that are used in determining who is indigenous in the study are not necessarily based on colonisation, on sovereignty, or on a prior claim to settlement, as alluded to by the ILO, but on a "longstanding relationship with land, forests, waterways, oceans and the air" (Durie, 2004:1139). The definition concerned is bound not to satisfy everyone, but, for the purpose of EE, it is important that the definition should take into account the state of fusion between the indigenous peoples and their accustomed environments.

2.4.2. Understanding the term 'knowledge'

Likewise, the term 'knowledge' is at the centre of intellectual debate with regard to knowledge generation, the legitimation process, and the way in which it manifests itself in society, with such debate being evident in Green (2008:144), Horsthemke (2004:31), and Moodie (2004:3231). Commenting on the use of the terms 'knowledge' and 'epistemology', Horsthemke (2004:3234–35) argues that, though they are used in liberal abundance, no account is given to their actual meaning(s). Thus, there is a general failure among theorists to appreciate, and to engage with, the ramifications of the concepts concerned.

Horsthemke (2004: 3234–3235), however, does offer a conceptual analysis of the criteria to be used in determining the nature of 'knowledge' and, interestingly, went on further to argue that the term 'indigenous knowledge' is inappropriate. According to said researcher (Horsthemke, 2004: 3235), irrespective of the cultural, social or political origins involved, knowledge has to meet the criteria of 'belief', 'justifiability' and 'truth', if it is, in fact, knowledge, and not merely assumption or opinion. However, this argument takes an imperial position that "knowledge and truth are not relative to a particular culture or social context" (Green, 2008:145). Horsthemke (2004:3234) writes, "[I]n isolation they (criteria) do not amount to knowledge, but in

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combination they are considered sufficient for knowledge." However, in the light of such criteria, the qualification of knowledge as 'indigenous' is, surely, redundant (Moodie, 2004:28).

However, the main orientation of 'knowledge', as the concept that is taken here, is drawn from personal experiences that were gained from teaching at two rural schools in the northern part of Namibia, as well as from constructivist approaches, postcolonial and other perspectives "which stand apart from positivist perspectives found in the literature" (Semali, 1999:309). To be more specific, the theoretical and conceptual understanding of knowledge(s) advanced in the current thesis is influenced by David Turnbull's (1997:551) idea of spatiality and performativity.

According to Turnbull (1997:552), there are two major positions that are concerned with knowledge production in different cultures around the world, or with how such knowledges should relate to one another. The first is the imperialist position, which states that scientific knowledge is uniquely distinguished by its rationality and methodology. It is universal, objective and true, within the limits of its own fallibility (Turnbull, 1997:552). The second is the localist position, which holds that all knowledge, including scientific knowledge, is value- laden and is 'situated' within particular sets of values (Turnbull, 1997:552).

Turnbull (1997:552) went on to divide the situated knowledge position into two key positions. Firstly, there are those, such as the proponents of Islamicisation of science or of the 'wisdom of the elders', who argue for the unique virtue of their particular value system. Those who recognise the differences between knowledge systems, but who are also concerned with ways in which the systems can coexist, hold the second position. Turnbull (1997:551) argues for the second position, which is also emulated in the current research.

Turnbull (1997:552) argues that few of the localist positions provide for a radical rethinking of how knowledge is produced in all cultures, or of the ways in which knowledge is linked to power. As summarised in Le Grange (2001:74), the research undertaken by Turnbull indicates that, generally, approaches have focused on the knowledge itself, to which he refers as a representationalist perspective, rather than on the processes involved in producing knowledge. However, according to him, such an overly representational view of knowledge can be balanced by recognising that scientific knowledge production is a social activity.

Turnbull's (1997:553) approach is, thus, to recognise knowledge systems as sets of local practices, so that it becomes possible to 'decentre' them, and to develop a framework, within which different knowledge traditions can equitably be compared, rather than absorbed into an imperialist archive. The researcher is concerned with how trust is established between heterogeneous knowledges that 'arrive' (or that are produced) in the same space. Turnbull (1997:553) argues that the basis of knowledge is not empirical verification, as the orthodox view would have it, but trust. He justifies his argument by using a wide variety of cultures, both ancient and modern, including those of Islam, India and China, the Americas, Africa and the Pacific, which were used before the inception of current science.

One of the major analytic contributions made in the Turnbull notion of spatiality is that all knowledge systems have localness in common, with it being possible to explain many of the small, but significant, differences between them in terms of the different kinds of work or performance that are involved in constructing 'assemblages' from the people, practices, theories and instruments that are present in a given space (Turnbull, 1997:553). The said researcher contends that no difference exists between the production of local knowledge and that of scientific knowledge, because both originate from local knowledge, which co-produces a knowledge space. Turnbull's arguments are reiterated by Le Grange (2001), who accepts the value of both types of knowledges. The work of the above-mentioned two authors is most useful in terms of considering thinking as a global issue and in relation to the articulations between global and local knowledge production, and how such matter directly relates to EE.

From the perspective of Turnbull (1997), and from that of other such postcolonialists as Shizha (2006), it can be argued that no knowledge is neutral, objective, absolute or value-free. Knowledge is embedded in people's cultural, social and political lives, and flows from ideological assumptions that are shaped by such factors as gender, class, ethnicity, language and religion (Shizha, 2006:22). It is constituted by what is 'true enough' for the task at hand, rather than by access to an absolute truth (Green, 2008:144) through empirical verification, as alluded to by Horsthemke (2004). Knowledge is about trust. In others words, one does not necessarily need to be right or to convince everyone else of the superiority of one's ideas. However, if a certain idea works well for the task at hand, then it is sufficient for it to be regarded as knowledge.

2.4.3. Indigenous knowledge

In the previous sections, the question of indigenousness and knowledge has been addressed, and, since indigenous people exist, it seems obvious that IK exists as well. 'Indigenous knowledge', which is a term that has its roots in anthropological literature (Briggs, and Sharp 2004:661), has been defined and redefined by intellectual scholars and researchers, but more especially by Western scholars "who seek to understand a cognitive system that is alien to them" (Battiste, 2002:3). However, the literature does not lend itself to the unanimous perception of the concept. This indicates the difficulty that is entailed in understanding what the term 'indigenous knowledge' means. It is also, in part, due to the differences in background and in the perspectives of the authors, ranging from social anthropology to agricultural engineering (Moatlhaping, 2007:26). A variety of related terms are found in the literature: 'traditional (ecological) knowledge', 'cultural knowledge', 'local knowledge', and 'community-possessed knowledge', among others. The said terms are, however, intertwined, and suggest that communities posses a body of 'knowledge' that is passed on from generation to generation. In the current thesis, the term 'indigenous knowledge' is chosen, because it is the term that is generally accepted in usage in Africa.

Warren (in Von Liebenstein 2000:7) defines IK as the local knowledge that is unique to a given culture or society. IK "contrasts with the international knowledge system generated by universities, research institutions and private firms" (Von Liebenstein, 2000:7). Warren treats IK as oppositional to Western knowledge, and Le Grange (2001:72) is of the opinion that such oppositional postures are better understood if they are viewed in the light of the dominance of Western epistemology. Warren (in Von Liebenstein, 2000:7) also views IK as being restricted to local people to a certain extent, when he echoes that IK is used as the basis for 'local decision-making' in a broad array of areas that include: agriculture; health care (the use of traditional medicine); food preparation; natural resource management; and a host of other activities in rural communities. However, urban communities are not excluded from being IK holders.

Though IK is labelled as being both local and traditional, because it is constructed and utilised locally, it has the potential to be used universally (Maila & Loubser, 2006:277). IK is cumulative, dynamic and adaptive (Battiste, 2002:4), which allows it continuously to accommodate new knowledge and innovation, including modern technologies. Semali and

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Kincheloe, as cited in Le Grange (2004:82–83**),** explain that IK "reflects the dynamic way in which the residents of an area have come to understand themselves in relationship to their environment and how they organise that folk: knowledge of flora and fauna, cultural beliefs, and history to enhance their lives". Odora Hoppers concurs with the above-mentioned authors that IK systems are not limited to cultural activities, but encompass technology, as well as the social and economic distinctiveness of people.

> The idea of indigenous knowledge … is not just about woven baskets, handicraft for tourists or traditional dances per se. Rather, it is about excavating the technologies behind those practices and artefacts: the looms, textile, jewellery and brass-work manufacture; exploring indigenous technological knowledge in agriculture, fishing, forest resource exploitation, atmospheric and climatological knowledge and management techniques, indigenous learning and knowledge transmission systems, architecture, medicine and pharmacology, and recasting the potentialities they represent in a context of democratic, equitable participation for community, national and global development in real time.
>
> (Odora Hoppers, 2002: 9)

Mahia Maurial, in Hart (2010:3), defines IK as "the peoples' cognitive and wise legacy as a result of their interaction with nature in a common territory". The legacy is composed of knowledge that is based on cognitive understandings and interpretations of the social, physical and spiritual worlds. IK is learned ways of knowing and looking at the world (Hart, 2010:3), which have evolved from years of experience and from trial-and-error problem-solving by groups of people working in their environments drawing upon resources that they have on hand (Williams & Muchena, 1991:52). It is a system of classification and self-management that is based on the empirical observation of the environment, but it also involves social and spiritual aspects. In other words, it is holistic.

Grenier (1998:2) elaborates that, apart from being socially constructed, IK is stored in peoples' memories and activities, and is expressed in songs, folklore, proverbs, dances, myths, cultural values, beliefs, rituals, community laws, local language and taxonomy, agriculture practices, equipment, materials, plant species and animal breeds. Furthermore, IK is shared and communicated orally (with it, generally, not being documented), by specific example, and

through culture (Grenier, 1998:1). Thus, for one to understand the complexity of the IK system, one needs to be an insider, because only through experiences and practice can IK gain exposure.

Accordingly, it can be deduced that IK is a composite of a holistic set of know-how, expertise and skills that is possessed by people from a specific place, with a common culture and social identity. It is a "process of learning and sharing environmental and climatic conditions, social life, histories, ethnic identity, economic and political unique to each cultural group" (Gaduka, 2012:3). Therefore, IK is developed continuously to adapt to the changing environments, and it is passed down from generation to generation through different sources, such as parents, indigenous experts, empirical trial, and even scientific information. Like all forms of knowledge, IK is shaped by individual experiences, and by interacting with their environment.

2.5 The reason for the inclusion of indigenous knowledge in environmental education

In the past two decades, IK has been the subject of renewed interest in many disciplines, including EE. The resurgence of IK from its colonial grave can be seen as a response to a number of changing perspectives. These changes of perspective are due to various factors, for example the involvement of Western science in the environmental crisis, the wanning of confidence in Western science (Shava, 2008:35), the success of certain community-based initiatives, the pressure that is exerted by non-governmental organisations (NGOs) and activist groups, and international conventions that are held by social and legal institutions among others.

In recent years, Western knowledge, which is based on models of industrialisation and capitalism, has been accused of contributing to a crisis of environmental degradation and unsustainability around the world (Hunter, 2002:7). Shiva, cited in Zazu (2008:21), highlights that using examples of Western scientific methods in agriculture, such as the use of pesticides, has raised concerns regarding the impact of Western scientific knowledge as a response to the different local and global ecological problems. Another example is the so-called 'Green Revolution'. According to Banavage (2008:19), the Green Revolution emerged in 1960 as a Western effort to modernise the Third World through agricultural technologies. The Green Revolution seeks to replace traditional methods of harvesting with Western mechanical technologies that exploit and overwork the soil. Brush (1992:148) states that the Green

Revolution has led to an increase in agricultural productivity and in support for global demand, with less interest in the environment. Due to the Green Revolution, indigenous practices and crops have been abandoned and replaced. The mixed forests of the indigenous people have also been converted to monoculture. Such a practice threatens biological diversity, and, without diversity, adaptation to the changing environment is impossible, and extinction is ensured. In this case, IK is regarded as countering Western science's destruction of the Earth, as well as the destruction of biodiversity.

Moreover, due to the extended experiences of learning within a condescending Western education system, indigenous scholars have discovered that, when they try to use Western knowledge to unravel the challenges in their societies, including the environmental issues, "they met with contradiction and failure" (Battiste, 2002:5). As a result, the postcolonial, poststructuralist and postmodern scholars have come to question the universality of science. They argue that Western knowledge is "narrow and short of the credence it claims to bear because it neglects the source of hypotheses and wonderment which mostly come from everyday knowledge like indigenous knowledge" (Phiri, 2008:15). Therefore, IK fills the knowledge gaps in the education, the research and the scholarship of the Western oriented. IK also increases the accuracy of the information, by triangulating between scientific and local knowledge. It allows for the cross-checking of the reality on the ground, and also of the sources being used, because the sources might lack certainty, or be slightly inaccurate for a number of reasons. Environmental problems are immense and complex, and, to manage their scope, complexity and uncertainty, it is important to take account of different types and sources of knowledge (i.e. the diversity of intellectual approach).

IK, which is relevant to EE in different ways, is locally produced/derived and contextually relevant. It focuses on the relationship of the human being with their immediate ecosystem. The diversity of spaces and species in their environment is a source of emotional, artistic and spiritual inspiration, as well as of cultural identity. For survival, a good understanding of such diversity is required. It provides the basis for problem-solving strategies for the local communities, especially in the rural areas (Von Liebenstein, 2000:7). Studies that have been undertaken in various parts of the African continent have shown that the majority of Africans still largely depend on IK for survival (Masoga, 2007:8). In Australia, for example, there has been a decline

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in interest in science education among learners (Gough, 2002:1211), due to the dependency on one mode of thinking, which is based on a materialistic view of nature having contributed to serious environmental degradation. Gough (2002:1211) contends that science education is a limited vehicle for EE, and, as a result, science needs to be reasserted in the curriculum, in the form of science being made to seem appropriate to a wider range of students than it has in the past, thus making it more culturally and socially relevant. Therefore, using IK in EE brings local knowledge into the formal education context, making education contextually relevant, and transforming the school into a platform for the sharing of diverse cultures, including Western science. Such practice re-establishes the school–community link by narrowing the gap between formal schooling and the learners' everyday life / home experiences. According to Masoga (2007:8), learning from IK, by investigating first what the local communities know and have available to them, can improve the understanding of local conditions and provide a productive context for activities that are designed to help the local communities.

Furthermore, the inclusion of IK in EE means giving rights to indigenous people that they may fully participate in the decision-making concerning the developments that affect their lands, cultures, and lifestyles. Such participation can be achieved by including IK holders, in decision-making capacities, in direct and meaningful involvement in shaping the particular problem or issue. In Masuku's (1999:105) study, which was conducted in South Africa, elderly indigenous people stated that they felt that they were being sidelined and prevented from playing the important role that they had played in the past as educators in their communities. IK in EE serves to re-establish the role of the community elder as educator. It was argued, earlier on in the current chapter, that the wisdom of elders was instrumentally important in passing on knowledge from one generation to the next, including knowledge about the environment that has not yet been documented.

Equally, not all indigenous practices are environmentally wise. IK also has its limitations, in the same way as [does] science, and there are some situations in which it is actually not useful (Masuku, 1999:74). Thus, IK alone is not a solution to all the environmental problems that exist. And if ample solutions to the spiralling environmental degradation are to be found, there is a need to complement the conventional science-oriented approach to EE with IK. Hence, advocacy for IK should not be interpreted as being aimed at discrediting Western science, and [at]

elevating IK. IK should complement, rather than compete with, Western knowledge, and the combination of these two knowledge systems will provide more complete information on the environment.

Finally, IK is very contentious. Its inclusion in the school curriculum (including in the EE curriculum) has not been welcomed lightly in some academic circles, more especially by Eurocentric thinkers, who have dismissed any sociopolitical cultural form of life that they did not understand, or anything that contradicts their line of thinking (Battiste, 2002:5). In what follows, the researcher attempts to discuss some of the issues arising from the two competing perspectives on IK and science education, that of the universalists, and that of the multiculturalists.

2.6   Locating environmental education in the indigenous knowledge and science debate: Universalists and multiculturalists

The integration of IK into the school science curriculum, a movement that emerged during the late twentieth century, has invoked a widely ranging philosophical debate in science education (Phiri, 2008:88). This is reflected in the number of publications that has been produced in terms of recent science education literature (especially in the USA). Though tension between IK and science (which is also known as Western modern science (WMS) or Western science) is not something new, but, nevertheless, the heated exchanges in recent symposia (Brickhouse & Stanley, 1994; 2001 Cobern & Loving, 2001; Siegel, 2002 Snively & Corsiglia, 2001), as recorded in some journals, are worth noting.

The said debate is mostly centred on the status of IK in the Science curricula and on the "comparison of IK with modernistic views of knowledge" (Darie, 2004:7; Masuku Van Damme & Neluvhalani, 2004:355). The debate has its origins in the relativist notion of what counts as 'truth' (or reality). With no intention of engaging in such philosophical debate, instead, the researcher seeks to give an overview of the debate by identifying the major issues, questions and themes concerned. The relevance of the debate to the current study is that it influences what should be included in the school curricula as 'science' and 'scientific knowledge', and how science should be taught (Stanley & Brickhouse, 2001:35) which, ultimately, will influence EE processes.

Embedded in said debate are two competing positions on science, namely universalism and multiculturalism (i.e. pluralism). According to Stanley and Brickhouse (2001:36–37), the case of universalists rests on several assumptions: (1) There is a strong realist claim that the natural world exists, irrespective of what humans think, and of their beliefs, as well as their beliefs about it. (2) The reality about the natural world has a structure that is universal and invariant, irrespective of local contexts and time. (3) The structure of the reality is knowable, and WMS is superior, in the sense that it provides the best, and a deeper, understanding of the natural world in terms of the criteria that are testable, predictive and explanatory than might otherwise be possible.

In response to the above claims, Siegel (2002:804) agrees with the first claim that universalists are committed to a sense of realism in the belief that the natural world exists, irrespective of what humans think. However, Siegel is quick to reject the extreme version of realism (i.e. strong realism) that Stanley and Brickhouse (2001:36–37) accorded to the universalists. According to Siegel (2002:805), it is "unclear why they attribute to universalists a realism stronger than the sort they endorse…" Regarding the second claim, of whether reality has a structure that is universal and invariant, irrespective of local contexts and time, Siegel (2002:805) disagrees with Stanley and Brickhouse. In defence, Siegel uses the strength of gravity as an example that differs significantly from region to region. He accuses Stanley and Brickhouse of failing to make a distinction between the universalist assumption and the WMS methodological directive. Regarding the third claim, Siegel (2002:805) agrees that reality is knowable and that "WMS has provided the most effective and reliable ways to discover knowledge about the natural world". Though Siegel (2002:806) does acknowledge the contribution and success of the 'ethnic sciences' he argues that, in terms of criteria (testable, predictive and explanatory, etc.), WMS is superior, as it provides a deeper understanding of the natural world.

Siegel (2002:810) continues to lessen the universalism and multiculturalism debate from epistemic to moral obligation. He argues that the best way in which to understand and to defend multiculturalism is not in epistemic, but in moral, terms. Multiculturalism can only be embraced in science education because it is deemed morally imperative to treat students from cultures other than that of the educator justly and with respect. Such thinking does not imply that such cultural beliefs and ideas are to "be treated as correct, or as correct as scientific ideas of the dominant

hegemonic culture" (Siegel, cited in Stanley and Brickhouse, 2001:38). However, it is an utter disservice to IK, or to multiculturalism for that matter, to suggest that IK integration can only be embraced on moral grounds, rather than on the grounds of its quality and the successful contributions that it has made to education. It is also worth questioning the assumption that WMS criteria are applicable, irrespective of any culturally specified local context. IK and WMS are two incommensurable discourses, neither of which can be judged against the criteria of the other (Tobin & Roth, 2009). Therefore, WMS criteria are incompatible for IK, and using science as 'gatekeeper' is not only problematic, but it is also counterproductive.

Universalists also express scepticism regarding the IK contribution to issues of sustainable development by questioning its applicability and impacts on the solution to environmental problems. For example, Berkes argues that some commentators in New Zealand consider traditional ecological knowledge (TFK) as an inadequate knowledge system for the guidance of sustainable harvesting (Berkes, 2009:45). The assumption is that, since IK is outdated, it is, therefore, "unable to adapt quickly to rapid global ecological change" (Berkes, Colding & Folke, 2000:1251). However, such prejudices about IK have been exposed by a growing numbers of researchers and scholars in this area (see Snively and Corsiglia [2001] for examples of successful local ecological knowledge). Hence, some universalists currently tend to think that IK is more successful in relation to ecological and environmental matters, compared to how it is in relation to other fields of science.

From a multicultural perspective, IK is as valid as is scientific knowledge, and, because IK is equally valid, it is justifiable to speak about 'indigenous sciences' (Tobin & Roth, 2009:55). Multiculturalists contend that all cultures develop bodies of knowledge concerning the natural world, and must be treated justly and with respect. Such a contention means that people should be allowed to speak their own indigenous languages, and that their contributions to Western science must be recognised and taught at schools. Multiculturalism recognises that "all systems of knowledge about nature are embedded in the context of a cultural group; that all systems therefore are culture laden; and that science (Western science) is the system of knowledge about nature that is predominant in Western culture" (Lewis & Aikenhead, in Eijck & Roth, 2007:926).

Nevertheless, there is more common ground between universalists and multiculturalists than is usually recognised. The universalism version, to which Siegel (and others that he cites, such as Matthews) contribute, recognises that science is culturally situated. Siegel agrees with Stanley and Brickhouse (2001:44) that the culture, the gender, and the racial and ethical make-up of the researcher influence "the truth claims of science", as such factors influence the conduct of the research involved. However, he maintains that such influences are rectified and refined through scientific processes. Michael Matthews, a universalist, claims that "[s]cientists propose, but ultimately, after debate, negotiation and all the rest, it is the world that disposes" (cited in Siegel, 2002:807).

As is the case with the constructivists and the multiculturalists, universalists agree that science is socially constructed. However, universalists reject what they call the 'extreme version' of constructivism, which even some multiculturalists (such as Stanley and Brickhouse) reject as well. Siegel (2002:807) writes: "[U]niversalists happily agree that scientific theories are human constructions in the sense that they are conceived, formulated, articulated, and revised by human scientists, typically over a considerable period of time by large numbers of them." However, accepting that science is socially constructed (which, the current researcher believes, is no different from non-Western ways of understanding the world) not only weakens the universality credential of science, but also exposes the fact that such a universality claim is narrow. Therefore, other social constructions, which are non-Western, deserve equal treatment in the school curriculum.

Stanley and Brickhouse (2001:47) even take the debate beyond epistemological diversity and suggested that, instead of showing learners that indigenous and traditional knowledge are different from WMS, it is important to show students "how those different views of science are firmly rooted in certain cultural assumptions that influence how they go about formulating and solving a problem of significance". They further state that, rather than pretending that science is uncontroversial, and/or teaching that it is so, it is suggested that the "student should be taught about the controversy over what is included in the science curriculum and how such decision might be made" (Stanley & Brickhouse, 2001:47). Such teaching includes scrutinising the debate within WMS, in order to identify the basis on which decisions have been made. Universalist opponents embrace the same approach too.

The reason for the above debate being relevant to the current study is, firstly, as was mentioned earlier, the debate is about what should be included in the Science curricula, and how it should be taught. Integrating IK in EE would also mean integrating IK in the Science curriculum, because EE teaching and learning take place in Science classrooms, with the assumption that scientific knowledge provides learners with the most valid, relevant and effective information. Secondly, there are different views and interpretations regarding the integration of IK into the Science curriculum. Therefore, those that hold a universalist position would see the integration of IK in the Science curriculum differently than would a multiculturalist. But, since all knowledge systems are socially constructed and culturally constituted, there seems to be no reason to devalue IK, just because it 'fails to satisfy the criteria of good science'. The integration of IK in EE should stress similarities, as well as differences, which is an area in which IK helps to fill the knowledge gap in WMS, and vice versa.

In conclusion, the advocates of multiculturalism should refrain from elevating IK to the status of a science. Doing so does not mean that, if they do elevate the status of IK in this way, "that they seriously restrict approaches to some of our most vexatious and debilitating environmental, science-technology, and socioeconomic problems" (Eijck & Roth, 2007:944). Therefore, time should be spared and attention focused on generating wisdom and new ideas as to how the two knowledge systems can work together. Such an intention is what forms the general aim of this research, namely to explore how IK can support EE, which is dominated by the Western approach. Finally, the basic tenet of biology is that diversity is the raw material of evolution and, without adequate diversity, adaptation to a changing environment is not possible, and extinction is ensured (Kimmerer, 2002:434). The statement just made not only applies to the diversity of species, but also to intellectual diversity that, in the end, will encourage the evolution of culture, and the ability of species to adapt to a changing environment.

2.7   Environmental education and indigenous knowledge in Southern Africa

This section explores the field of post-Rio EE and IK practices and research in Southern Africa, as an extension of the above. It reviews some of the local initiatives that have been taken in Southern Africa, and which focus on the importance of IK in environment-related fields, by identifying some of the major findings, critiques, claims and, most importantly, recommendations for further research. However, the discussion in the current chapter is not

intended to be a balanced summary of each publication consulted, but seeks to include key aspects that the researcher has found relevant to the present study. Discussion of the works is presented chronologically.

Masuku, in her master's thesis titled *The role of indigenous knowledge in/for Environmental Education: The case of an Nguni story in the Schools Water Action Project*, opens up the concern that curriculum perspectives on IK have begun to develop. Masuku (1999:3) uses an IK narrative on water as a 'springboard' for exploring the role of IK, and the wider implications of IK processes, in schools. Masuku (1999:105) observes that elderly indigenous people have expressed a feeling that they are being sidelined, and that they are regarded as being unable to play the important role that they played in the past as educators in their communities. She argues that there is a need for the contextualising of teaching and learning instructions, which should make the experience relevant for both learners and parents:

> Homework that encourages inputs from parents by questioning the everyday way of life may sharpen and contribute to the development of a critically reflexive community within the local environment of the school.

(Masuku, 1999:107)

Masuku's (1999:106) recommendation that education should get the elderly involved, especially in addressing the socio-historical environment audits, influenced the selection of participants for the current research. However, it should be noted that the wisdom of elders is neither limited to socio-historical, nor to biological issues, but, instead, covers a wide range of issues, including the detailed observations of population ecology and species interactions that arise as a result of a long-term association with a particular flora and fauna.

A noteworthy publication in the above respect is a monograph that was published by the South African Development Community-Regional Environmental Education Programme (SADC-REEP). Titled *Indigenous knowledge systems in environmental education within communities in Southern Africa: a handbook* (2000), the monograph covers a diverse collection of case material that illustrates the place of the IK system in relation to the ordinary, everyday livelihood led in some sample situations in Southern Africa. The cases emanate from the observations made by the participants in the SADC-REEC IK workshop (3–5 August 1999). Namibia's contribution to

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the workshop, which was made by Henk Coetsee of the Ministry of Environment and Tourism (MET), and which is entitled *Intellectual property right and medical plants in Namibia* states:

> [I]t appears that there are no real and clear mechanisms in place to protect the possible right of communities possessing indigenous knowledge over their intellectual property right and/or their full right to natural resources.

(Coetsee, 2000:40)

The contribution (i.e. the case study) reveals that devil's claw (*Harpagophytum procumbun* and *zeyberi*) is a Namibian medical plant that should be protected against over-exploitation in harvesting, due to the recorded dramatic increase in its export and complaints about its over-utilisation. Considering the above observations, there is a need for reviewing the national (Namibian) legislation, for consultation with communities, and for raising public awareness and interest in IK.

In her influential book *Indigenous knowledge and the integration of knowledge systems*, Odora Hoppers (2002) calls for the re-evaluation of modern and traditional knowledge systems. Consisting of 15 chapters by different authors, the book is arranged in three sections: conceptual and foundation issues; IK and the discipline; and IK protection. The first section addresses the question of power relations, by exploring the role of the social and the natural sciences in IK development. Odora Hoppers (2002:7) writes that "a major threat to the sustainability of natural resources is the erosion of people's knowledge, and the basic reason for this erosion is the low value attached to it". In the second part of the book, the author probes the issues of the IK system against the background of colonialism, the development of science and the African Renaissance, and the contribution of IK systems to the healing of the pain and tension of colonial oppression. The last part of the book, which explores the transformative potential of IK systems, the political and intellectual property rights concerned, and the place that exists for such systems in post-postmodernism.

The Environmental Education Association of Southern Africa (EEASA), in partnership with the Human Sciences Research Council (HSRC), published a monograph, *Environmental education, ethics and action in Southern Africa* (2002), which discusses the environmental challenges that are encountered in diverse Africa contexts, with most contributions coming from South Africa,

Angola, Lesotho, Zambia, and Zimbabwe. For instance, a chapter by O'Donoghue and Neluvhalani explores the developing methods and the methodological perspectives for mobilising IK within environmental learning activities in the school curriculum. After providing an empirical review of the historical evidence and the case studies and stories involved, the two authors illustrate the ambiguities that are associated with the historical appropriation, the marginalisation and the current re-appropriation of IK:

> Environmental learning is proving to be a rich and challenging arena for mobilising and clarifying indigenous knowledge process…. In our examination of historical evidence and the probing everyday life practice articulated in mother tongue, we have found out that the terrain that provided a capital of indigenous knowledge were cross-cutting interaction and inter-epistemological challenges.

(O'Donoghue and Neluvhalani, 2002:134)

While acknowledging the importance of documenting and interpreting IK, Shava (2005:2273) notes that there is a lack of emphasis on the practical application of IK in terms of educational and community development:

> Research on indigenous knowledge should shift its focus more into the consideration of its application for it to have meaningful long-term impact. This calls for investigations into application possibilities in educational as well as community development arenas.

Beyond the boundaries of Southern Africa, Masuku Van Damme and Neluvhalani (2004) provide an overview of the social process analysis of IK research in the Southern Africa arena, drawing attention to their previous work and to other related research (such as that of Shava, 2000; Turnbull, 2000; Gough, 2004, etc.) in exploring processes of developing institutional necessities that are favourable for the transformative potential of IK, in the context of innovation for development. The formal education system has been found lacking, in that it is not contextually relevant to the learners, and does not prepare them to cope with, and to relate to, their immediate environment, thus attention needs to be paid to the process of mobilising IK within the ambit of EE.

Recently, in Zimbabwe, Shizha (2007) carried out a study analysing the problems that had been encountered in incorporating IK into Science teaching by primary school teachers. Most teachers

totally dismissed incorporating indigenous science into school programmes, because they believed that social knowledge, or cultural knowledge, had no place in the teaching of Science. The challenge that IK has had to endure is overcoming such negative attitudes that are exhibited by teachers, who are strong role models for the children whom they teach. Shizha (2007:23) argues that some teachers undervalue the effectiveness of IK in developing techno-scientific skills that are applicable to scientific principles that could lead to the sustainable use of indigenous resources in rural development.

Zazu (2008) also explored the opportunities and challenges of integrating IK system into EE processes in Zimbabwe. The said study was conceptualised within the context of the Sebakwe Environmental Education programme, the findings and the recommendations thereof present valuable lessons in epistemological pluralism. Zazu (2008:11) addresses issues ranging from inter-epistemological dialogue, through multiculturalism, to participatory teaching methods. Participatory methods that have characteristics of the indigenous ways of teaching are already being used within the Sebakwe Environmental Education programme, thus providing room for the contextualisation of the learning processes concerned.

In the field of education (i.e. in curriculum development), and in EE in particular, there has been profound enthusiasm and deliberate propositions identifying strategies and methodologies that are required to integrate IK into the mainstream curriculum. In South Africa, for example, the post-apartheid curriculum policy mandates that both IK and environmental concerns be integrated into all school-learning areas/subjects (Le Grange, 2012:56). The infusion of EE and IK into the mainstream curriculum in South Africa is a movement in the right direction that other African countries, including Namibia, should emulate. It is one of the most important ways of strengthening cultural values, of promoting environmental protection and awareness, of realising sustainable local economies, and of supporting students through healing and decolonising.

Indeed, the research concerned is not the first of its kind, but a fair amount of research has been done in relations to issues of similar interest, which could add to the existing body of literature. However, surveying the above publications not only served to expose the limited understanding of the current researcher regarding IK, but it also triggered his curiosity about, and his eagerness to study, how IK could be used to support EE in Namibia. Such was more especially the case

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since Namibian researchers have been passive in said field, and no research, up until the time of the current study, had engaged critically with, and narrated a more nuanced and ethically dimensioned perspective for, the field of IK in/as EE process in Namibia. The SADC-REEP initiatives to develop IK materials and Masuku Van Damme and Neluvhalani's (2004) involvement in mobilising IK in EE could not go unnoticed. Their advocation of "contextual and epistemological relevance" in the local educational processes (Shava, 2008:58) emanates from increasing dissatisfaction with the Western knowledge hegemony in environmental management. As Odora Hoppers (2002:7) writes, "the legacy of Western rationality in no longer unchallengeably dominant, and its universal validity in particular is under question".

The research that has been undertaken into IK and EE is wide, and goes beyond what has been discussed here. It is with regret that historical and theoretical findings and recommendations, and global events that preceded the most recent increased recognition of IK in both science and EE are beyond the scope of this chapter. Attempting to cover such a wide area is not just impossible, but would go beyond the available space, therefore it deserves a chapter of its own. For the purpose of the current research, it is deemed that the above coverage is sufficient enough to provide an overview of events, at both global and local level.

2.8   Education reform and environmental education in Namibia

Approaches to EE during the past two decades have expanded, as the understanding of the environment and the process of teaching and learning have advanced. The emergence of wide-ranging and complex environmental issues and risks of social justice, equality, democracy and social transformation have proved many approaches to EE to be unsuccessful. Such approaches have been based on a narrow perspective of education, research, and communication, as well as even of the nature of the problem that they were supposed to address. With the 1992 Earth Summit (Agenda 21) being instrumental in such transition, Namibia is no exception. This part of the current study in a snapshot of the situation prevailing in that country, which traces demographic, historical, political and social developments that have taken place in Namibia since 1990. The emphasis is placed on international and national developments that have led to the present Namibian EE policy, and to the inclusion of EE in the education curriculum. Moreover, an analysis of the National (Namibian) Curriculum for Basic Education and of the Life Science curriculum is undertaken, focusing exclusively on how IK is coupled with EE at school level.

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Namibia is situated in the south-western portion of Africa, along the Atlantic Ocean, and bordering on South Africa, Botswana, Zimbabwe, Zambia and Angola. It is a country with vast open spaces, and which is rich in minerals, an isolated marine ecosystem, woodland, wetland and two of the world most dynamic deserts, the Namib and the Kalahari. The diverse and unique ecosystem concerned sustains the largest population of cheetahs and free-roaming desert elephants, arrays of colourful insects, a forest of quiver trees, a field of lichens, and a wide array of acacia thorn (Smego, 2002:6840), as well as the famous 2 000-year-old welwitschia plant. Though relatively underpopulated, with approximately 2.1 million inhabitants, of whom 58% are rural and 42% are urban dwellers, Namibia is a diverse nation. The 11 different ethnic groups that form the majority of the population present in the country consist of: the Basters; the Bushmen; the Caprivian; the Damara; the Herero; the Himba; the Kavango; the Nama Owambo; and the white. Each of the eleven national groups has its own history, language and culture, and, as a result of the South African apartheid policy, its own homelands, although that system has since been abolished (Namibia Guide Travel.Net, s.d.).

According to Smego (2002:6840), before the arrival of Namibia's first colonists in the 19th century, the local people were nomadic pastoralists, and vast areas of land were relatively unoccupied. Indigenous conservation methods, including the Ovahimba people's rotational grazing system, the Sun Bushman's spiritual connection to the wildlife and the full use of every hunt, and the Ovambo people's subsistence farming methods of planting millet, gathering wild food and keeping livestock were mostly used. Such traditions and practices are mature and long-standing, as, for many years, not only have they sustained the indigenous people, but they have helped them to live in harmony with nature.

When the colonialists invaded Namibia, the results of colonisation were consistently devastating. IK was dismissed as "primitive, unsophisticated, inferior" (Kuokkanen, 2000:411), unsystematic, and incapable of meeting the productivity needs of the modern world (Von Liebenstein, 2000:2). Currently, the task of locating IK is certainly more difficult, in the light of the burdens that have been imposed by the colonial legacy (Smith, 2005). Even more challenging is the fact that some indigenous people have themselves come to accept the idea that their knowledge is inferior, which is an idea that is more especially held among the youth. Yet, the hope is that IK has not, or

at least not entirely, disappeared from the collective memory of the elders, more especially those in the rural areas.

One of the most significant experiences that Namibian indigenous peoples share is loss of land. According to Smego (2002:6840), Namibian indigenous peoples were forcefully chased from their productive and fertile lands of the Central Highlands, when the settlers began their own livestock and agricultural farming on what is currently commercial farmland. Indigenous people were left with no choice but to live on a much smaller plot of land, which the former apartheid overlords regarded as communal land, or ethnic homelands, according to their policy of 'separate development' (Smego, 2002:6840). The north–south border, known as the Red Line, was, and continues to be, used infamously and effectively to keep black Namibians out of commercial farming, in line with the apartheid policies in the past.

The unequal land distribution has had several implications for the environment. With the Namibian population having grown from 1.8 million in 2001 to 2.1 million in 2011, of which 58% reside in the rural area, the population pressure and the unequal distribution of land have exacerbated the land degradation in the rural areas. The worsening of conditions has been due to the increased demand for firewood, the clearing of vegetation for cultivation and grazing, as well as the browsing of livestock, just to mention a few of the factors responsible. For instance, in Northern Namibia, which is the mostly densely populated part of Namibia (in terms of livestock and human population), wildlife has virtually disappeared, due to the severe land degradation (Smego, 2002:6840). It is against such a background that immediate interventions were required, at the time of the current study, to prevent further damage to the environment. However, the transition from an inequitable, unsustainable past to a sustainable future poses a formidable challenge to the government and to all sectors of the society.

After the first democratic election was held in 1990, the policy of apartheid, based on racial segregation, was abolished. The political change and the demise of the apartheid policy system prompted a series of changes across all walks of life, including education. The current education policies are guided by Article 20 of the Namibian Constitution, which entrenches the right to a decent education for all, with the education in question being universal, compulsory and free at primary school level. The legal ramifications of the above have been translated into a national

education policy document *Toward education for all* (Gonzales, 2000:104), which was adopted in 1993. The main thrust of this postcolonial policy includes the abolishing of racial discrimination in education; the establishment of compulsory education, structured from age six to sixteen; the introduction of English as a medium of instruction from Grade 4 up to Grade 12; the creation of a single Ministry of Education (MoE) and Culture; and the introduction of the International General Certificate of Secondary Education (IGCSE) (which has since been changed to the Namibia Senior Secondary Certificate Ordinary/Higher (NSSCO/H)) curriculum and syllabi. Furthermore, *Toward education for all* discourse exists to emancipate the nation as a whole, using culture as a unifying and national building force. Such emancipation can be achieved by cultivating a culture of nationality, by the removal of cultural prejudices, and by integrating Namibia's diverse heritage into the school curriculum. The underpinning educational philosophy, which is referred to as a 'learner-centred approach', is based on the principles of social constructivism that were also adopted in the policy to replace the 'teacher-centred education' that was used in the past.

Prior to Namibia's independence, many of its people lacked the appropriate skills and knowledge that were required for sustainable living. The lack was due to the inadequate principles, the operational framework and the viewpoint that were used to promote EE during the time of colonial rule. Not only were the above-mentioned principles, framework and viewpoint inadequate, but they were also discriminatory, due to them excluding the majority of people from the management, the benefits and the use of the natural resources that were available at the time. Most schools were characterised by disparities in terms of the availability of physical and human resources. The social, economic and resource inequalities experienced at the time have led to Namibia's current environmental problems. Environmental problems that are common to Namibia include: degradation; the destruction of woodland areas; desertification; population growth; rural and urban land use conflicts; pollution; scant water and declining fish resources; threats to the survival of wildlife; overstocking; overgrazing; and bush encroachment (Katoma, 2002:11).

The protection of the remaining environment and the raising of awareness regarding it has become one of the top items on the agenda in both the government ministries and in NGOs. The government has made substantial efforts by injecting a large percentage of its resources into such

an endeavour, and by formulating the necessary policies that promote the sustainable utilisation of natural resources by all Namibians. The above is reflected in two important documents: the Namibian Constitution, and The Green Plan. Article 95 of the Namibian Constitution pledges the state to adopting policies that are aimed at maintaining the ecosystems, the essential ecological processes, and the biological diversity and utilisation of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future (Article 95(I)). The Green Plan is a guide to environmental management that was adopted and presented by the former Head of State Sam Nujoma at the Earth Summit (Agenda 21) in 1992 (Kanyimba, 2002:20). In the Plan, he committed the Namibian government to developing an environmentally literate society, in which citizens have the knowledge, the skills, and the values that are necessary for appropriate action in this regard (Monroe, 1994:7).

To ensure that such policies are implemented, there was a need to create an environmentally literate nation, which understood the consequences of the past, in order to try and take necessary action to live sustainably for the benefit of the present and the future generations (Enviroteach, 1995:1). Such an assignment required coordinated efforts from different stakeholders. The government, supported by a number of private institutions and NGOs, was, therefore, responsible for providing environmental information, by conducting assessments of environmental conditions, and by making EE accessible through formal or non-formal channels (Monroe, 1994:1).

EE has been identified as being essential in achieving an environmentally literate nation. The MoE, which was formally known as the Ministry of Basic Education, Sport and Culture, has made environmental awareness one of its stated goals. According to Katoma (2002:19), the *Towards education for all* policy document states that "basic education will promote the development of environmental awareness through the development of a holistic understanding of the dynamic interdependence of all living things and their environment". The inclusion of environmental awareness in the curriculum is, therefore, in keeping with the requirements of the Constitution and the Green Plan, mentioned above.

2.8.1. Namibia Environmental Education Policy

According to Monroe (1994:1), in May 1993, a conference on EE, which was attended by participants from across Namibia, was held at Hardap, and resulted in the establishment of the

Namibia Environmental Network (NEN). Funded by Rossing Foundation, the aims of NEN, among others, were to coordinate communication among the various EE and communication entities; to offer professional development to environmental educators; to provide a vehicle for exchanging innovative ideas; and to engage them in projects. The Network also played a pivotal role in the initial formulation of the National Environmental Education policy. The said policy embraced the Belgrade Charter's (UNESCO, 1975) definition of EE, which reflects Namibia's commitment to international agreements (see previous section 2.3). It is also recommended that EE should be incorporated into the formal education curriculum, as a cross-curricular issue.

Additionally, the advancement of EE in the curriculum was, and continues to be, influenced by a number of internationally funded development projects and initiatives, including the Life Sciences Project (1991–2000), the Enviroteach Project (1992–1999), the Forestry Awareness and Tree Planting Project (1996–2002) (Nashilongo, 2009:34), Support Environmental Education issues in Namibia (SEEN), and the Namibia Environmental Education Network (NEEN), among others (Tshiningayamwe, 2011:3). The said projects have all specifically contributed to EE development programmes, and have mostly been funded by the Danish government, and spearheaded by the MET, the MoE, the Ministry of Agriculture, Water and Rural Development, the Ministry of Youth, Sport and Culture, and NGOs.

According to Kanyimba (2002:20) and Tshiningayamwe (2011:3), the establishment of the NEEN marked a cornerstone in the history of EE in Namibia. The Network plays a vital role in facilitating information sharing in EE, and in empowering Namibians to take action that will contribute to environmental sustainability. In relationship to the Green Plan and Article 95 of the Namibian Constitution, a policy for EE and related extension work has been drafted with the help of NEEN of 1999. The policy states:

> Namibia will actively encourage, support and implement environmental education as a means of achieving and fulfilling Article 95 of the constitution. Environmental education should aim to empower Namibians, from all sectors, and to critically evaluate environmental information and options, to make informed decisions, and to take actions that will contribute to the goal of environmental and economic sustainability.

(Kanyimba, 2002:20; Tshiningayamwe, 2011:3).

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The emphasis of EE policy is on creating awareness, by empowering individuals to regain control of their environment through participation in decision-making at both local and national level. Such participation includes "recovering, recognising, respecting and utilising indigenous history and local culture as well as promoting cultural linguistics and ecological diversity" (NEEN, 2009:2). The above quotation, acknowledging the historical perspectives of native people, is directly taken from the principles of the International Council of Adult Education (ICAD) of 1992. But NEEN appeal to ICAD principle is unfortunate, for they ignore the very next passage, which makes direct references to IK, and which, thus, misses the main point of the document. The omitted point reads, "Environmental education values all different forms of knowledge. Knowledge is diverse, cumulative and socially produced and should not be patented or monopolised" (ICAD 1992 as cited in Shava, 2008:254). The exclusion of the latter principle in the EE policy is so vague and ambiguous that one wonders whether IK is given serious consideration at all. However, it is not the intention of the current author to probe the matter further here.

The NEEN policy also addresses the knowledge gaps that require attention in order to help both teachers and learners to develop a better understanding of the environment in its totality – it must be taken into consideration that the environment is not only limited to the biophysical, but also encompasses natural and built, technological and social (economic, political, technological, cultural-historical, moral and aesthetic) factors. (See Figure 2.1 below for illustration of the multifactorial nature of the phenomenon.) In addition, since 2003 NEEN has offered a certificate course in EE.
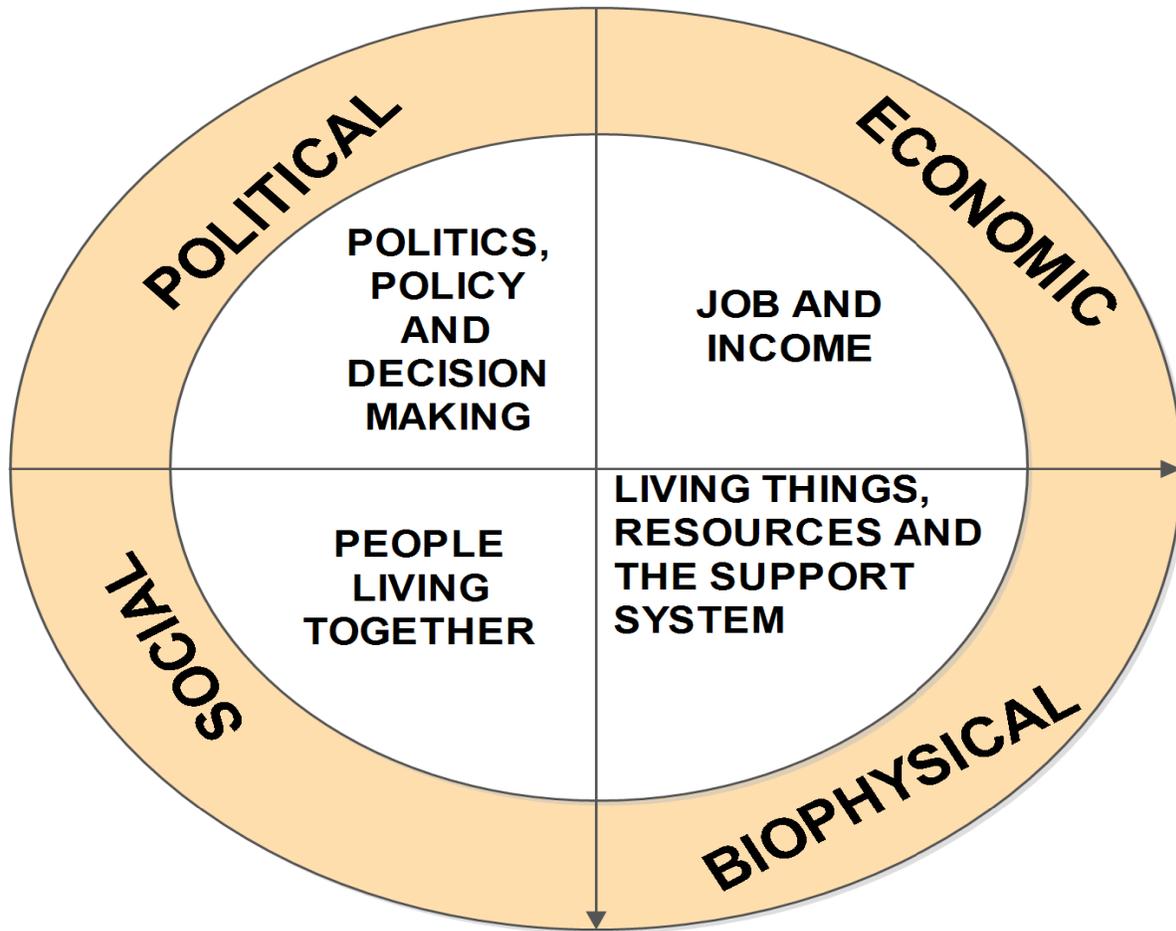
Figure 2.1: Factors included in the environment

Source: Adopted from Simalumba (2011:27)

2.8.2. The National Curriculum for Basic Education (2010): environmental education and indigenous knowledge in Namibia

The 2010 National Curriculum for Basic Education for Namibian schools, which replaces the Pilot Curriculum Guide for Formal Basic Education and Senior Secondary Education (1998) will be discussed in this subsection of the chapter. In particular, the foundation of the current curriculum, and its relationship to indigenous culture and knowledge systems, as well as to EE, will be discussed. The question is to what extent the recognition of IK, coupled with EE/sustainable development has been taken into consideration in the new Namibia Curriculum.

According to the Ministry of Education (MoE) (2010:1), the new curriculum has been developed to give direction to basic education, towards the realisation of Namibia Vision 2030. The said

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Vision is a long-term developmental plan that clearly spells out the country's development programmes and strategies to achieve its national objectives of becoming a knowledge-based society, meaning a society in which knowledge is constantly being acquired and renewed, and used for innovation to improve the quality of life. The driving force for realising the objectives of Vision 2030 are: education, science and technology; health and development; sustainable agriculture; peace and social justice; and gender equality. One of the major principles upon which Vision 2030 is based is 'partnerships', which is recognised as a major prerequisite for the achievement of dynamic, efficient and sustainable development. The term 'sustainable development' is a recurring concept in said document, which shows Namibia's commitment to such international agreements and treaties as Agenda 21 and other treaties on sustainable development.

Due consideration must be given as to what the values are underpinning such a developmental goal, and which knowledge systems are to be applied to ensure that such developmental goals are met by 2030. With regard to said values, the Curriculum is explicit on general values that are required to nurture a knowledge-based society. The Curriculum proposes that, "[o]nly with a strong cultural and individual identity and positive values is it possible to influence globalisation and not be overwhelmed" (MoE, 2010:8). The aim is to "foster the highest moral and ethical values of reliability, co-operation, democracy, tolerance, mutual understanding, and service to others" (MoE, 2010:8). However, the above can only be achieved by means of the adoption of a learner-centred approach that utilises learners' cultural experiences for independent and critical thinking. Yet, the use of a learner-centred approach is a challenging task for many teachers, for a number of reasons, ranging from a lack of training, through overcrowded classrooms, to a lack of resource materials, and beyond.

On closer analysis of the Curriculum, however, it is clear that the terms 'sustainable development' / 'environmentally sustainable' figure prominently, compared to the term 'IK systems'. Such language usage is in view of the commitment of the MoE to spearhead the realisation of Vision 2030, as can be seen below:

> The characteristics of a knowledge-based society are the effective and wise use of existing knowledge and the creation of new knowledge; sharing and using knowledge effectively through a dynamic information infrastructure; using high-level technology and research to create

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innovations and sustainable development for people and the environment; flourishing entrepreneurship in a growing production-based economy; and equity.

(MoE, 2010:7)

It is, therefore, clear that education is seen as an important tool for achieving change and sustainable development. In the Social Sciences for Senior Secondary phase, sustainable development is included as one of the competences that learners should strive to achieve. The Curriculum proposes that, upon completion of their education, learners should "know how to contribute actively to the sustainable development and growth of a knowledge-based, equitable, democratic society" (MoE, 2010:23). EE, as a distinct term, appears nowhere else in the Curriculum document. However, the lack of such distinctive use of the term does not mean that the MoE does not take the issue of the environment seriously. Rather, EE is a cross-curricular subject, and environmental learning takes place across the entire curriculum, and in all the aspects of schools. However, there is no such subject as Environmental Education within the Namibian schooling system. Such an approach is in support of the Ahmedabad Declaration (2007), which encourages the use of different pedagogies in schools and other formal learning, as a means of integrating EE and ESD principles with transformative learning approaches across all area of the curriculum (Education, 2008b:87).

Though IK provides a framework for the transformation of educational discourse in Africa, in that it respects diversity, acknowledges lived experience, and challenges the hegemony of Western Eurocentric forms of universality, the concept only features once in the general goal of the new curriculum. The Curriculum proposes:

> The concept of knowledge thus embraces indigenous knowledge [IK] and local and national culture, as well as international and global culture. In the Namibian context, this includes the strong collaborative culture which is characteristic of African society.

(MoE, 2007:2)

Other rarely used concepts that relate to IK are: 'traditional and local knowledge'; 'own learning experiences'; 'multicultural settings and communities'; 'different cultural, linguistic, and social contexts'; and 'cultural backgrounds'. Notwithstanding that the goal of a curriculum that embraces IK gives the overall direction for education, the concept is overwhelmed by the

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constant usage of such terms as 'scientific knowledge'; 'science'; 'modern'/'modernised'; 'technology'; and 'global culture', which have their origin in Western epistemology. Furthermore, the persistent use of such concepts as 'independent think'; 'critically'; 'problem-solving'; 'investigating'; 'interpreting'; 'critically analysing'; and 'evaluating', is not surprising. According to Breidlid (2009:144), concepts like the above "do not exist in isolation and are familiar to anyone with some knowledge of curricula from the North".

The impression is that the curriculum is modelled on Western discourse, depending heavily on different international contexts. More especially, until 2007, Namibia imported the British IGSCE curriculum, using the University of Cambridge Local Examination Syndicate for the validation of its examination. The assertion that the Namibian curriculum has Western bias can be further justified by the hegemony of English, which has been adopted as a medium of instruction in schools, and which has been granted the status of an official language. The language issues will be discussed at greater length later on in this chapter.

The next concern is to evaluate the extent to which IK is coupled with EE / sustainable development in the new Namibia Curriculum. It should be noted, however, that the National Environmental Education Policy, though not explicit on the point, does acknowledge the importance of recovering, recognising, respecting and utilising indigenous history and local culture, as well as that of promoting cultural linguistics and ecological diversity. The question is whether this has been reflected in the new curriculum, and, if not, what implications this poses for the implementation of the EE policy.

To answer such questions, special attention will be given to one specific aim of the Curriculum, "achieving an environmentally sustainable society", with Life Science having been introduced as a subject specifically to address environment-related concerns. According to the MoE (2010:8), an 'aim' is a general statement of what is to be achieved through the learning process as a whole.

> The aims of the curriculum in relation to developing an environmentally sustainable society are to provide the scientific knowledge and skills, and attitudes and values needed to ensure that the environment is respected and sustained; and to develop the ability to make environmentally wise choices in terms of family development, as well as in economic activities.
>
> (MoE, 2010:8)

Though not surprising (more especially in the light of scientific knowledge and education being viewed synonymously), the above statement should be sufficient to raise the alarm. One does not need a microscope to notice the absence of IK and other related underlying concepts. Probably intentionally, the seemingly uncritical absence of, or the non-reference to, IK is worrisome, more especially seeing that IK has been identified as a rich source for sustainable development. The observation further testifies that, even after the national EE policy attempts to partner IK and EE, the new curriculum is still firmly grounded in a modern, Western epistemology. Such grounding is evident in the curriculum's reliance on scientific knowledge and skills as the only way of attaining sustainable development. A South Africa sculptor, poet and writer, Pitika Ntuli, is in agreement with the above analysis.

> Our education system seems to move farther and farther away from indigenous knowledge . . . There is no attempt at any level to examine the indigenous knowledge system's awareness of the essential interrelatedness of all phenomena – physical, biological, psychological, social and cultural.

(Ntuli, as cited in Breidlid, 2009:145)

Pam Christie, one of the leading scholars on the South African curriculum, has expressed a belief that the collapse of a radical approach to education is part of the process of globalisation and the curriculum (Nekhwevha, 1999:504). The Namibia Curriculum is driven by its long-term development goal of Vision 2030, which sees Namibia becoming an industrial society. In support of the above-mentioned Vision, the MoE (2010:1) states that rapid changes, such as technology advances, globalisation, HIV and AIDS, and environmental degradation, make it necessary to re-evaluate the guidelines governing the purpose and content of education. "It is directed towards helping achieve the national development goals … and the long-term perspective of Namibia Vision 2030" (MoE, 2010:1). Nevertheless, what is clear is that Namibian education has done the least to embrace IK as a legitimate source of inspiration for the future generation and for local development. Even after it has been proved by various studies around the world, including in Africa, that there is a growing recognition of the value of IK for sustainable development, Namibia has yet to recognise its value. For IK to have a significant influence on EE/ESD in Namibian society, it must first be given full recognition and it must be implemented in school and other social institutions.

2.8.3. Indigenous knowledge in the Namibian Life Science curriculum

EE is taught as cross-curricular themes that form part of most school subjects. Subjects that incorporate EE are regarded as 'carrier subjects' and are summarised in Table 2.1 below.

Table 2:1 Subjects incorporating EE at school level

School phase	Subjects
Lower primary: Grades 1–4	Social Studies; Environmental Studies; Natural Science & Health Education
Upper primary: Grades 5–7	Social Studies; Natural Science & Health Education; Religious and Moral Education (RME); Home Ecology; Elementary Agriculture
Junior secondary: Grades 8–10	Geography; Home Economics; Business Studies; Development Studies; Life Science: Physical Science; History
Senior secondary: Grades 11–12	Geography; Natural Economy; Biology

Source: Adopted from Kanyimba (2009:76)

For the purpose of the current study, the emphasis is placed on Life Science for two reasons. Firstly, though not exclusively, the said subject was/is designed for the purpose of environmental learning. Secondly, the present researcher was a Life Science teacher between 2007 and 2010. The subject Life Science, which falls within the natural science area in the junior phase, emerged from a Life Science project that started in the 1990s, which was funded by the Danish government. The subject emphasises the learners' understanding of the physical and biological world around them at the local, regional and international level.

The concern is to what extent IK is integrated into Life Science. In response, one needs to analyse the occurrence of IK and its related concepts in the syllabus for Life Science. However, having taught the subject for four years, the current researcher finds that it is easy to point out that indigenous, local, traditional and cultural knowledge are unfamiliar concepts. This is not

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surprising, when one realises that the national curriculum has only paid lip service to such concepts.

However, the curriculum requires teachers to contextualise their teaching and learning instructions, in order to make learning more appropriate to the learners. Yet, the curriculum uses the international standard as a benchmark for validation. It states:

> The learning content in this syllabus is based on the Namibian context, although the themes and topics are on a variety of scales to meet international standards. Teachers are therefore urged, where appropriate, to use local examples to illustrate scientific issues, concepts and processes.
>
> (MoE, 2010:2)

In the above-mentioned case, the contextual examples are only used to advance the learning of science, and they do not promote and use cultural knowledge to solve environmental problems. Therefore, one needs to be wary and critical of using a cultural/local example if it is only perused to serve the purposes of Western science. The curriculum emphasises helping learners to "develop a sense of responsibility towards the environment, relating scientific practices to sustainable use of natural resources" (MoE, 2010:2). As Breidlid (2009:140) writes, sustainability is, thus, more or less exclusively linked to a modernist, scientific approach, with a dash of poverty reduction strategies. However, not all scientific practices are sustainable. In fact, science has been blamed of contributing to a crisis of environmental degradation and unsustainability (Hunter 2002:7).

Furthermore, the syllabus requires learners and teachers to "develop and enhance respect for, understanding of, and tolerance of other people's beliefs, cultures and ways of life" (MoE, 2010:2). However, the syllabus fails to acknowledge that such beliefs, culture and way of life are useful in advancing an understanding of the environment. The curriculum is silent on the protection and the promotion of the use of IK in EE. However, the power of IK lies on its application in daily life, but it is obvious that there is, in practice, only one knowledge system in operation, and that IK does not belong to this discussion.

In support of the above claims, when Mosimane (1998) investigated the significance of local knowledge as a resource and determined whether it arbitrated in the management of natural resources in the Eastern Caprivi region of Namibia, it emerged that IK was not part of the direct school curriculum. Furthermore, the marginalisation of IK systems is not exclusive to Life

Science; it is a cross-curricular issue that affects all EE 'carrier subjects'. Recently, Simalumba (2011) investigated the implementation of environmental learning in Geography in Caprivi, and made a similar observation. Simalumba (2011) claims that people (teachers and local people) seem to be aware of the availability and the importance of IKs in terms of sustainable living, but that the application of IK in everyday life and teaching could not be verified. However, cultural practices are immersed in the traditional songs, dramas and festivities in which schools participate annually.

In conclusion, it is undisputed that EE and sustainability in Namibia is closely determined by the national education curriculum, which has retained a Western bias. More especially, the infusion of EE into the subjects of Life Science, Natural Economy, Agriculture, Biology and Geography, which use Western and scientific-oriented assessment systems put the inclusion of IK at stake. The nation-based policy and advocacy initiatives, especially those coming from the MoE, regarding IK systems are also limited.

2.8.4. Indigenous languages: an aid for sustainability

Through education and the erosion that has taken place through the mass media, indigenous thoughts and voices have been silenced and dominated by Western cultural symbols, especially languages (Shizha, 2006:306). Language has been, and continues to be, used as one of the powerful instruments in advancing the colonial agenda. In most African countries, indigenous languages have been marginalised since the times of colonialism, when they were "discounted as invalid and irrelevant in contemporary Africa" (Shizha, 2006:306). Even worse is the persistent use of foreign languages in most, if not all, African schools and universities. Such retention of outsider influences not only poses a danger to the survival of IK / culture, but it seriously breaks down communication between learners, teachers and parents. Because of the language barrier, many students fail to understand important concepts in EE.

Therefore, if quality education is the way to sustainability, "the focus must be both on the negotiations between knowledge systems in class, but also on the question of the language in which these negotiations take place" (Breidlid, 2009:146). In other words, knowledge and language have an underdetermining relationship, with the two being inextricably interlinked. The words and their meanings are the vehicle for the conceptual ordering of categories, and for the

relationships that constitute the world view of the speaker (Odora Hoppers, 2002:227). Such a fact is well articulated by Brockman, Masuzumi and Augustine, (1997:2), who states:

> [Indigenous] language embodies a value system about how we ought to live and relate to each other … it gives name to relations among kin, to roles and responsibilities among family members, to ties with the broader clan group. There are no English words for these relationships because your social and family life is different from ours. Now if you destroy our language, you will not only break down these relationships, but you also destroy other aspects of our … way of life and culture, especially those that describe man's connection with nature, the Great Spirit, and the order of things. Without our language, we will cease to exist as a separate people.

The Namibian indigenous languages represent a great storehouse of knowledge and tradition about the environment and the ancient culture of Namibia, which could benefit not only the indigenous people themselves, but the nation at large. However, postcolonial policies and practices continue to marginalise the languages concerned. The use of English as the [only] official language, and also as the medium of instruction in schools, has given it an official importance that was not accorded to any other language in Namibia at the time of the current study. Mother tongue (i.e. indigenous language) is only (supposed to be) used as a medium of instruction during the first four grades of schooling. Thereafter, it is only taught as a subject, whereas English is used as a medium of instruction for the rest of a child's schooling. As such, English has been positioned on a higher language pedestal than have all of the indigenous languages (Shizha, 2006:306).

Nekhwevha (1999:491), after examining the Namibian and South African post-apartheid education transformation programmes, also argues that both education systems deliberately exclude the culture and language skills of the dominated from the curriculum, in order to keep African people in a state of alienation. Nekhwevha's (1999:491) observations remind the current researcher of his time spent at Onesi Senior Secondary School in Northern Namibia in the early 2000s, when the students were punished, and even fined, for speaking their vernacular language on the school premises. As a result, the Namibian indigenous languages became more and more endangered, compromising cultural survival.

The above account explains how the use of English, or any other foreign language, and the dominant Western knowledge model are used as standards to silence the indigenous and the promoting of what Vandana Shiva (1993, as cited in van Liebenstein, 2000:7) calls "monocultures of the mind". The said author argues convincingly that monocultures first inhabit the mind, and are then transferred to the ground. Monocultures of the mind generate models of production that destroy diversity, and which legitimise the destruction concerned by regarding it as progress, growth and improvement. Such monocultures are also responsible for the disappearance of indigenous, local or traditional knowledge, practices and languages, which are often labelled as non-scientific and non-universal (van Liebenstein, 2000:7).

However, Shizha (2006:306) reminds one that, if restoration of cultural identity is to be achieved, it should start with the revitalisation of the indigenous languages. Apart from being a tool for communication, language plays a vital role in the way in which people express their cultural view of the world, and their existence. More importantly, the restoration of IK is the sensible solution to learners' cognitive, emotional, sociocultural and academic development. According to UNESCO (1968):

> (T)hrough his mother tongue ... every human being first learns to formulate and express his ideas about himself and about the world in which he lives. Every child is born into a cultural environment; the language is both a part of and an expression of, that environment. Thus, acquiring of this language, his mother tongue, is part of the process by which a child absorbs the cultural environment; it can, then, be said that this language plays an important part in moulding the child's early concepts. He will, therefore, find it difficult to grasp any new concept which is so alien to his cultural environment that it cannot readily find expression in his (her) mother tongue.
>
> (cited in Breidlid, 2009:146)

Due to the above, therefore, it is extremely important to recognise the fundamental role of language in the transmission and in the interpretation of IK, as well as in the learner's cognitive development. Also, the promotion of indigenous languages within EE programmes is an essential skill for communicating within indigenous communities and with elders. In addition, it reinforces a deeper understanding of IK than might else be achieved, and it lays the foundation for cultural survival.

The hegemony of the English language in Namibian postcolonial policies and practices, however, might be justified by its global importance in terms of industrial and technological communication. For some educators, English and EE are inseparable. According to Shizha (2007:64), "English is the language of science". What needs to be understood is that the presence of the English language in Africa, and in Namibia in particular, is a result of colonisation and imperialism. A Brazilian educator, Paulo Freire, in his famous book *Pedagogy of the oppressed*, 42 years ago warned against the persistent worshipping of Western knowledge and languages in the postcolonial era. Freire (1970:36) observes that the oppressed want, at any cost, to resemble their oppressors, which could mean speaking the oppressor's language, and abandoning their own. However, Freire (1970:36) stresses that, if the oppressed want to end colonialism, they "must be their own example", by changing their own way of thinking, and even speaking their own language.

Chapter 3

Research Methodology

3.1 Introduction

The general aim of this study is exploring how indigenous knowledge could be used to support environmental education in two selected rural schools in the Omusati region in the northern part of Namibia. In order to achieve the above aim, it is important to first decide on the type of research methodology that will be used in order to best accommodate the phenomenon under investigation. A research methodology is a philosophical framework that guides the activities of the research. The chapter begins by identifying and discussing the four major research paradigms, raises the implications for the ontology, epistemology and methodology that each presents. Based on the exploratory nature of the research question and the fact that IK is culturally embedded, an interpretive paradigm is adopted as an appropriate methodology and design to address the identified research issues. Within the framework of interpretation, the chapter provides an overview of methods of gathering data, analytical strategies, and methods of establishing trustworthiness and ethical procedures that are employed to accomplish the aim of this research.

3.2 Research paradigms

In the previous chapters it has been discussed that different people hold different perceptions about what is the nature of reality. And because there are different views regarding the nature of reality, it is necessary for researchers to identify and locate their personal understanding of the nature of knowledge or their ways of viewing the world before embarking on a specific academic research project. Such understanding helps researchers to identify the philosophical framework that guides the activities of the research and to identify appropriate research methods. There are different philosophical frameworks that guide social sciences research and these are mostly referred to as research *paradigms* (Mertens, 1998; Guba and Lincoln, 1994) or a world-view (Creswell, 2007, 2009). In the current study, the term paradigm will be used.

The term "paradigm" derives from the work of the historian of science Thomas Kuhn to refer to a particular stance or standpoint which governs the way an individual views a phenomenon and

guides their approach to research. According to Mertens (1998:6) a paradigm is composed of philosophical assumptions that guide and direct thought and action. Similarly, Le Grange (2009:2) stated that a paradigm "serves as maps or guides for scientific/research communities, determining important problems and issues for their members to address and determining acceptable theories and methods to solve identified problems/issues."

The main research paradigms in social science are positivism, post positivism, interpretive/constructivist and critical theory. The four approaches take distinctively different positions about the nature of reality (ontology) and how we can understand it (epistemology) and assumptions that are held by researchers in a specific field tradition (methodology) (Maxwell, 2004). These positions are mostly based on theoretical foundations, assumptions, and purposes for each research paradigm and they can produce competing or complimentary modes of inquiry. Table 3.1 below is a representation of the distinguishing features of different research paradigms.

Table 3.1: Research paradigms

	Research paradigm			
Assumption	**Positivism**	**Post positivism**	**Interpretivism/ Constructivist**	**Critical Theory/ Emancipatory**
Ontology **What is real?**	Naïve realism- "real" reality but apprehendable	Critical realism- "real" reality but only imperfectly and probabilistically apprehendable	Relativism-local and specific constructed reality	Historical realism- virtual reality shaped by social, political, cultural, ethnic, and gender value; crystallized over time.
Epistemology **What is true?**	Dualist/ objectivist; finding are true	Modifies dualist/ objectivist; critical tradition/community; finding probably true	Transactional/ subjectivist; created findings	Transactional/ subjectivism; value mediated findings
Methodology **How do I examine what is real?**	Experimental/ manipulative; verification of hypothesis; chiefly quantitative methods	Modified experimental/ manipulative; critical multiplism; falsification of hypothesis; may include qualitative methods	Hermeneutical/ dialectical	Dialogic/dialectical Action research

Source: Guba and Lincoln (1994:109)

According to Maxwell (2004:37), choosing a research paradigm primarily involves assessing which paradigm best fits your own assumptions and methodological preferences. In selecting the research paradigm for this study, the main ontological, epistemological and methodological

assumptions of the four research paradigms as proposed by Guba and Lincoln (1994:107) were taken into consideration. Understanding the nature and differences between these research paradigms as illustrated in Table 3.1 above helps the researcher to locate and justify the selection of research for this study. The paradigm determines how the research problem is formulated and methodically tackled. In what follows, the four research paradigms will be briefly discussed and its implications for IK and EE research.

Positivist and post-positivist paradigms

The *positivistic* and *post-positivist paradigm*s are based on a similar ontological assumption that there is a single reality about the world. Positivism is based on the assumption that basic laws exist which governs all phenomena and social reality exists independent of people. Factors within these phenomena can be objectively investigated, separated and quantified for statistical analyses by employing valid and reliable measurements. Post-positivists have a lighter touch of realism than positivists on the basis that human beings are imperfect, and we can never know the whole truth but we can get as close as we can (Wilson, 2001:175).

Positivists and post-positivists separate themselves from the world they study. They employ careful and controlled observation and use all the facts and figures from their observations. Feelings, emotions and internal meanings of individuals are unimportant as they cannot be observed or measured. Their inferences are made based on "empirical analytical knowledge" (O'Donoghue 2007:9) of such observations. From a postpositivist perspective, the researcher and the researched world are independent entities and the researcher can objectively study the world without influencing it or being influenced by it (Guba & Lincoln, 1994:10).

However, for this particular study which attempts to investigate how IK can be used to support EE, positivist paradigm is not suitable for several reasons. IK is "knowledge about how to live" (Maweu, 2012:40) "embedded" in the experience and teaching of a community (Battiste 2002:1). Coming to know a specific detail of an indigenous way of living in nature is a journey that requires experiential processes (Aikenhead & Ogawa, 2007:539). As Intellectuals, Freire and Faundez (cited in Denzin, Lincoln & Smith, 2008:136) suggested that, [researcher and scholars] "should soak themselves in this knowledge, assimilate the feelings, the sensitivity of epidemiology that move in ways unimagined by most Western academic impulses". Since the

positivistic approach separates the researcher from the world and the research problem, the researcher is unable to interact with the community deeply so as to understand complex indigenous and environmental issues that are embedded in social, cultural, economic and political realities.

Critical paradigm

Another notion linked to educational research is the now well established *Critical paradigm*. Critical research emerged from critical theory which aims to promote democracy by influencing changes in different social, political, cultural and economic systems. Some authors reject the labelling of this paradigm as "critical theory" because critical theory is associated with Marxist theory (Mertens, 1998:15). Instead, they adopt a concept called "emancipatory paradigm". In this study, critical research paradigm is seen as embodying different ideologies such as postmodernism, neo-Marxism and feminism (Mack, 2010:9).

Critical researchers are concerned that social realities are not value free but always historically constituted, produced and reproduced by people. Educational researches, schools and all other forms of knowledge production such as social institutions, like that of the media and the legislatures are seen as powerful tools (O'Donoghue 2007:11). They represent and serve the interest of some powerful groups of people in society, usually rich white males (Mack, 2010:9). Therefore, they are "problematic and capable of systematic distortion" (O'Donoghue 2007:11). Research on education that adopts a critical paradigm challenges the inequalities in knowledge production and other dominant discourses including western science.

Looking at the above, the critical research paradigm is appropriate in dealing with IK related research because the research agenda is to emancipate individuals and groups in an egalitarian society (Cohen et al, 2011: 26). It is also appropriate as it contends that reality is affected by our culture as indigenous people, our language and all other factors that create an indigenous perspective (Wilson, 2001:176). However, this study is not directly intended to intellectually transform individuals or society for that matter, rather, it is aimed at exploring and understanding how IK can be used support EE.

Interpretive paradigm

The methodological approach to this study is informed by an interpretive paradigm. According to Abrams, Taylor and Guo (2013:12) the "interpretive research paradigm foregrounds the researcher's cultural situatedness and its role in shaping his/her relationship and interpretations of the culturally different others worldview". It is concerned mostly in generating contextual based understanding of human experiences (Cohen, 2011:17). It is also known as social constructivists approach (see Creswell, 2007) because it emphasizes the ability of the individual to construct meaning regarding the fundamental nature of a social world. Similarly, the main concern for the current researcher is to understand the way in which the individuals interpret the world around them.

It is important however, to note that the interpretive paradigm is not immune to criticism. Post-colonial indigenous researchers challenged Western research paradigms including interpretive approach to conducting research, particularly research on people of colour. According to Chilisa (2012:39) even interpretive research operates within the Western historical and cultural-bond research framework which treats IK as barriers to research or exotic customs with which researchers need to be familiar with. As a result, post-colonial indigenous researchers proposed an "indigenous research paradigm" as an alternative to indigenising approaches and Western research paradigms.

According to Wilson (2001:175), the difference between indigenous paradigm and traditional/dominant paradigms is that the latters are based on assumption that knowledge is an individual entity that can be gained and owned by an individual researcher. Whereas, indigenous paradigm is centred on assumption that knowledge is relational. Wilson (2001:175) explains further that from an indigenous paradigm perspective:

> Knowledge is shared within all of the creations. It is not is not just interpersonal relationships, not just with the research objects I may be working with, but is the relationship with all the creation. It is with the cosmos, it is with the animals, with the plants, with the earth that we share this knowledge. It goes beyond the idea of individual knowledge to the concept of relational knowledge.

From the above perspectives, it is undisputed that there are more disagreements than agreements between indigenous research methodologies and traditional science-inspired Western research (both quantitative and qualitative) with regard to the the nature of reality. However, if interpretive as a distinct paradigm is instead taken and compared with indigenous paradigm, the distinction between the two diminishes as more similarities emerge (e.g. see Lowan 2011:140 for a detailed analysis). This means that although the interpretive paradigm has traditionally been placed within the Western traditional paradigm camp, most of its methods are compatible with indigenous paradigm.

Furthermore, Abrams, Taylor and Guo (2013:12) argue that contemporary interpretive studies based on qualitative techniques such as case studies are regulated by numerous quality standards associated with intersubjectivity. Therefore such studies are well suited to the task of understanding the socially complex, variably rich and context-specific characters of education such as IK and EE. It acknowledges the importance of community stories, belief systems and spiritual and earth connections as legitimate sources of knowledge (Chilisa, 2012:45). Therefore, the interpretive research paradigm produces an suitable methodology that allows one to move beyond polarized notions, and that disrupts the dichotomy between Western research and indigenous research methodologies.

Finally, it is the choice of the researcher to adopt an approach that will best address the research problem and that suits the researcher's world-views. This view of appropriateness has been advocated by, among others, Patton, (1990:39) who states that: "A paradigm of choices rejects methodological orthodoxy in favour of methodological appropriateness as the primary criterion for judging methodological quality". Patton's views of appropriateness and the researcher's theoretical assumptions too impacted on the methodological choices. In the next section the theoretical assumption informing this study will be discussed.

3.3 Theoretical assumption

In the previous chapter, it was argued that the understanding of "knowledge" informing this research is drawn from personal experiences that were gained from teaching in rural schools, as well as from the constructivist approaches and postcolonial perspectives, more especially Turnbull's notions of spatiality and performativity. Likewise, the theoretical assumption for this

study is informed by the Turnbull's (1997:551) notion of a "situated knowledge position" that recognizes the differences between IK and western sciences but at the same time is concerned with ways in which the two can work together. The basic assumption is that coexistence of these knowledge systems and their associated know-how would enrich our understanding of the environment and the associated problems. In other words, this research does not seek for a unique virtue of IK, rather it explores ways in which IK and western knowledge can work-together to support EE.

Both western scientific and indigenous knowledge have something to contribute to our understanding of the environment. However, at the same time each has limitations of its own. The point of contention is that the two perspectives taken together could produce a more rounded understanding of natural and cultural environments and sustainable development as it relates to both people's thoughts about their practices as agents and our perceptions as observers (Sillitoe, 1998: 226). Therefore, the current westernized EE curriculum in Namibia needs to open up formal learning to a wider range of cultural experiences. The outcome of such efforts would then produce a

> pedagogical space in… [environmental education] classroom that (i) catered to both a rigid, top-down, state mandated curriculum designed to produce citizen-workers for the global knowledge economy and (ii) responded sensitively to the diverse needs of academically disadvantaged students struggling to find meaning in their school lives.

(Taylor, 2008:882)

Such an approach to environmental education in this instance refers to new understandings of the environment which emerge from the integration of IK into EE, which is currently highly westernized.

However, integrating IK into EE is a collective process involving different stakeholders in education. Figure 3.1 below simplifies how different educational stakeholders could be involved. In this study, the stakeholders identified are teachers who are curriculum implementers and advisory teachers who are curriculum specialists and developers of the national curriculum as well as traditional leaders or village heads and elders who are by virtue of their ages experiences are custodians of vast knowledge about the environment. However, the process of incorporating

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IK into EE is far beyond the boundary set for this study. It involves IK holders, policymakers, curriculum planners and teachers who are:

> [c]onscious of the vitality of blending or creating a hybrid of indigenous knowledge and Western science and transforming pedagogies that help students examine important values, assumptions, and information embedded in other cultural perspectives.

(Shizha, 2007:316)

Figure 3.1 represents a model of how stakeholders can get involved in the process of integrating IK into EE.
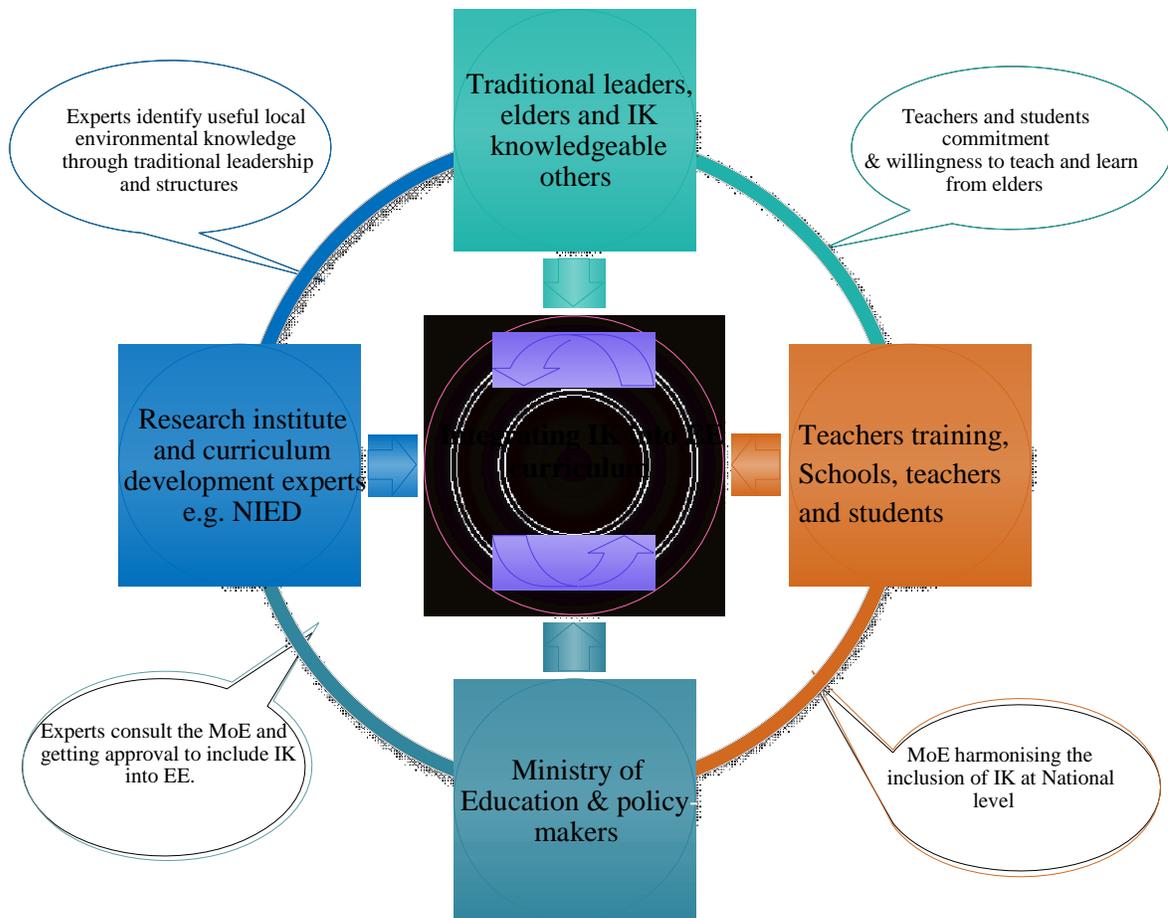
Figure 3.1 A model designed to show how stakeholders should get involved in the process of integration IK into EE

Sources: Adapted from Kolawole (2007:1439)

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The main assumptions are that traditional leaders or any other known community elder should work together with curriculum experts in an effort to bridge the gap between the mainstream environmental curriculum and traditional environmental knowledge. This is because environmental awareness is not something new to indigenous people, as they have succeeded by using their knowledge to protect the environment for many centuries.

3.4 Research design

This part of the study outlines the research design adopted in this study. The common function of a research design is to ensure that the evidence obtained enables the researcher to answer the research question as unambiguously as possible (De Vaus, 2001:9). The main research question guiding this study is: How can IK be used to support EE in two selected Namibian rural schools? In choosing a research design to answer the above question, the worldviews and assumptions that the researcher brings to the study, procedures of inquiry and specific methods of data collection, analysis and interpretation (Creswell, 2009:3) were taken into consideration.

- Firstly, the interpretive paradigm has been justified as the philosophical approach informing this study.

- Secondly, the common interpretive research designs include narrative, ethnography, phenomenology, biography and case study. These designs rely mostly on methods that produce qualitative data. Different opinions exist as to whether the above are designs or methods. Creswell (2009:3) for example, views a research design as either qualitative, quantitative or a mixed method. However, it is erroneous to equate a particular research design with either qualitative or quantitative or both. The distinction between qualitative and quantitative is only possible at the level of data (Le Grange 2000).

- Thirdly, participants in this study are mostly indigenous people, who for a long time have been the subjects of research as opposed to participants. Therefore, choosing a culturally appropriate and respectful research design protocol that is compatible with indigenous people's experiences is fundamental to the criteria (Kenny, 2004:8).

- The phenomenon that is being studied here is the support that EE can potentially get from IK. IK (a) is complex phenomenon which is embedded in people's subjective experiences, social and cultural context, spiritual being and is shaped by languages and

(b) is dynamic and continually influenced by internal creativity and experimentation as well as people in contact with external systems (von Liebenstein, 2000:7).

- Equally, EE is a multidimensional process, designed to serve different purposes and purposes vary with different audiences, needs and contexts.

- EE does not take place in a social vacuum and EE practices are neither independent of cultural and social context in which they operate, nor are they neutral to education policies. It operates within the framework of a dominant culture with specific political outlooks, attitudes, values and norms (Arnesen, Bîrzéa, Dumont, et al., 2008: 12)

- To understand both IK and EE requires a research approach that would enable the researcher to interact with the researched as deeply as possible and that provides sufficient contextual, cultural scopes to apprehend complex indigenous and environmental issues.

The above assumptions provides fertile ground for choosing a case study design employing methods of collecting qualitative data as the most appropriate for fulfilling the research aims.

3.5 Case study design

This study takes the form of a case study design involving two rural schools from the Omusati region in the northern part of Namibia. The generic term "case study" has a range of different meanings but for the purpose of this study two will be used. Yin, (2009:2) a respected authority on case study design defined a case study as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context especially when the boundaries between phenomenon and context are not clearly evident". Rule and John (2011:5) positioned in the context of South Africa, define a case study as a systematic and in-depth investigation of a particular instance in its context in order to generate knowledge. The above definitions imply that a case study is an in-depth inquiry of a particular instance within a real-life context in order to grasp a comprehensive understanding of a chosen phenomenon. Yin, (2009:19) added that a case study is more appropriate when studying a contemporary phenomenon.

Case studies are used to serve various purposes. The most important use according to Yin (2003:20) is explanatory; "to explain the casual link in real life interventions that are too

complex for the survey or experiment strategies". It generally answers questions of 'how' or 'why'. Simons (2009:21) explains that a case study generates a deep understanding of a specific topic, person, classroom, policy, an institution, programme or country to generate knowledge and/or inform policy development and/or professional practices. In this study, a case study serves as the basis for generating knowledge and recommendations for a local EE curriculum.

Multiple methods of collecting qualitative data are often used in a case study to facilitate in-depth, "thick, rich description of the case and illuminating to its broader context" (Rule & John, 2011:7). Observations, interviews, audiovisual material documents and reports (Creswell, 2007:73) are generic to case studies. However, there are many other methods one can choose from, both qualitative and quantitative, to extend or deepen an understanding of the case. In particular, the envisaged research utilises two methods of collecting data for this case study, namely field journal and audiotape interviews. According to Yin, (2012:36) interviews are an essential source of case study evidence because most case studies are about human affairs.

3.5.1. Description of the Omusati region

The research was conducted at two schools in the Omusati Region, North- Central Namibia. Omusati region is one of the thirteen administrative regions found in Namibia (Figure 3.2) which is divided into twelve political constituencies namely; Anamulenge, Elim, Etayi, Ogongo, Okahao, Okalongo, Onesi, Oshikuku, Otamanzi, Outapi, Ruacana and Tsandi. It is important to understand from the outset that the North-Central area was formally known as 'Ovamboland' following the establishment of homelands in South West Africa in 1964 (Newsham & Thomas, 2009). It was subsequently split into the four "O" regions – Ohangwena, Omusati, Oshana and Oshikoto – that are part and parcel of Namibia's post-independence geography.
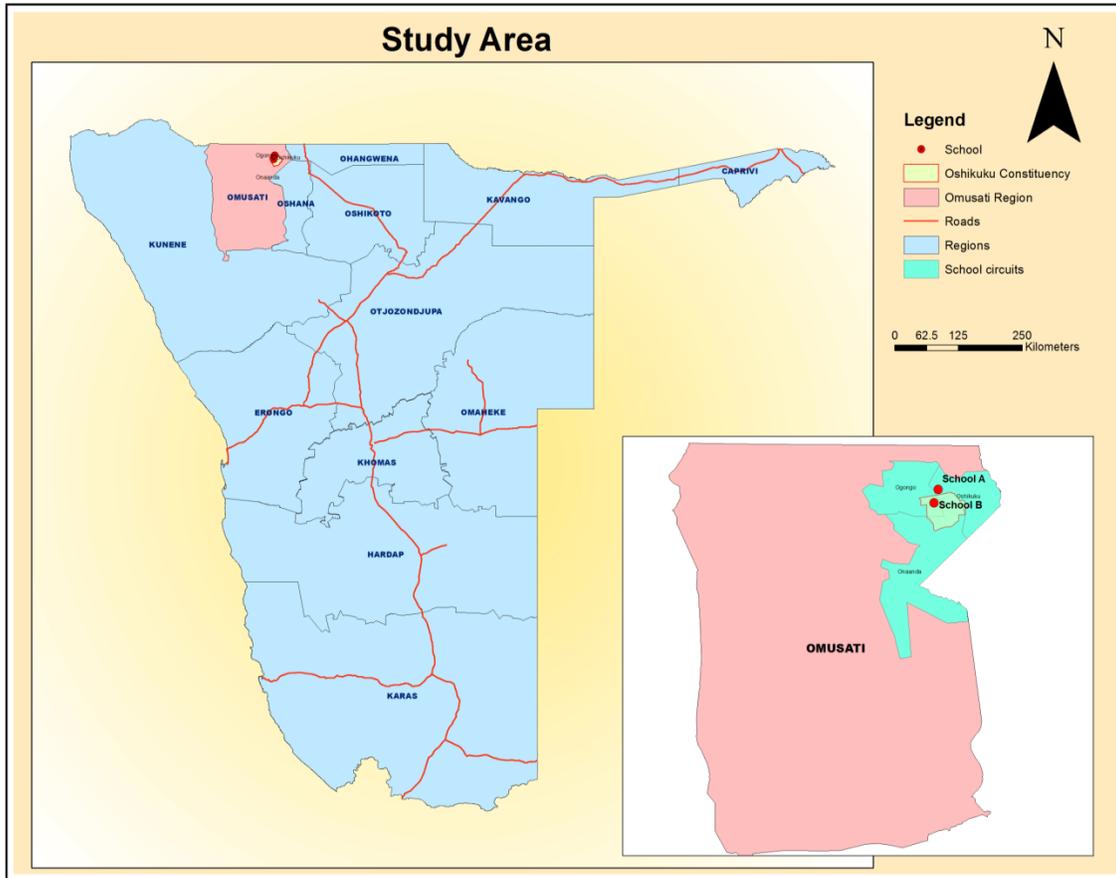
Figure 3.2: Omusati region map and location of schools

According to the 2011 census preliminary results, Omusati Region has a population of about 242900 inhabitants with each person living on 9.1 square kilometer (National Planning commission (NPC), 2012:1). The dominant ethnic group is the Owambo (as is the case with other three "O" regions). Owambo is a collective name given to people living in formally known as (and still frequently referred to) "Ovamboland" and there are subgroups with different dialects.

The Wambos *(aawambo)* are Bantu-speaking agro-pastoralists, depending heavily on both crop and livestock farming for survival (figure 3.3). The former is mostly the responsibility of women and the latter the responsibility men. The common crops are pearl millet, sorghum, and maize and are supplemented by vegetables and legumes, most commonly beans, cowpeas, Bambara nuts, groundnuts, pumpkins and melons, and more rarely spinach and cabbages (Newsham *&* Thomas, 2009:11). The livestock includes cattle (*Nguni*), goats, sheep, and donkeys. Keeping

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both crops and livestock is thus a major strategy in coping with low fertility and high unpredictability just like elsewhere in sub-Saharan Africa (Verlinden & Dayot, 2005:143).

Figure 3.3. An Oshiwambo traditional homestead on the inside (left) & outside (right) (Namibia Tourism Board 2013)

Figure 3.4 showing cattle in makeshift fence, mahangu field (millet) and homestead at the background
Source: Namibia Tourism board (2013)

In addition to the above, the Omusati landscape is made up of a successive series of sand dunes of varying depths, separated by network of shallow, interconnecting ephemeral water courses (ORC, 2010:3). This supports the production of fish and various trees and plant life that can be eaten or used for house-building, basketry or medicinal purposes (Newsham & Thomas, 2009:140). Plants such as Makalani Palms, Fig trees and Marula trees are abundant species

across the region and provide wild fruit resources to supplement agricultural produce. The Mopene tree (known as Omusati in Oshiwambo where the name of the region was derived) is not only used for building materials but it is also a breading site for Mopane worms, a traditional delicacy for Oshiwambo speaking people.

However, there are also longstanding concerns about environmental degradation in North-Central Namibia and Omusati in particular. Deforestation has been identified as one of the leading environmental concerns as a consequence of (colonial) settlement patterns and land reform policies of the new government, thus resulting in unsustainable living in the region (Erkkilä, 2001:118; Verlinden & Dayot, 2005:143). However, according to Erkkilä (2001:45), the underlying forces driving deforestation and forest degradation are complex, and even though there are global dimensions to this issue, the causes vary greatly from one context to the other. Socio-economic factors have a great impact on how natural resources are used by the Owambo people. Therefore, to address such challenges requires a cross-sectional cooperative approach (Erkkilä, 2001:118) that utilizes multiple perspectives and IK offers a different but complementary perspective.

Several ethnobotanical and anthropological researches have been carried out to examine and document traditional uses of medicinal plants and knowledge in relation to wider cultural background (Davies, 1994; Nakapipi-Amakali & Mushaandja, 2010; Cheikhyoussef, Shapi, Matengu & Ashekele, 2011:1), indigenous management practices of farming, grazing, trees and agriculture (Newsham & Thomas, 2009; Verlinden & Dayot, 2005:143; Fujioka, 2010:129) and traditional food and beverages (Ashekele, Embashu & Cheikhyoussef, 2012:913). Among others, these studies revealed that concern about health is not restricted to the physical and spiritual well-being of individuals but extends to include harmonious social relations, environmental and economic prosperity (Davies, 1994: i). It also emerged that the North Central indigenous farmers have developed and use a sophisticated, widespread and long-established body of knowledge to understand, classify and utilise the environment for agricultural purposes (Newsham & Thomas, 2009:2).

The above-mentioned studies placed emphasis on examining and documenting IK, perhaps with the concern that it is somehow getting lost. But, little or no attention has been paid to the extent to which such knowledge could be used complement science dominated mainstream education

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and how it could benefit learners and the community at large. Elsewhere, Seely, (1998:267) argued that science and community action can connect but they cannot do so without proper levels, degrees and types of participation from both sides of the equation. It is the assumption of this author that if IK is to be taken seriously, it first needs to be formalized into mainstream education. But formalizing IK and integrating it into the educational process as mentioned earlier is a collective responsibility.

3.5.2. Selection of research sites/cases, research methods and rationale

The selection of the research sites was done using purposive sampling. According to Sharan (1988:48) purposive sampling "is based on the assumption that one wants to discover, understand, gain insight; therefore one needs to selected a sample from which one can learn the most". The researcher actively selects the most productive sample to answer the research questions as opposed to random sampling. In this regard, schools selected for this study are from rural areas because IK is more prevalent in rural communities compared to urban communities. In addition, the school should offer Life Science or Biology at the secondary phase (8-12).

The current study will take place at A and B schools in the Oshikuku constituency of the Omusati region and are within Uukwambi traditional authority. Uukwambi is a subgroup within Owambo near Namibian and Angolan borders. In most respects, schools are surrounded by villages that correspond to the Omusati profile described above. This means that traditional leaders, parents, teachers and learners at A and B schools are predominantly Oshiwambo-speaking from rural areas where the majority of households are subsistence farmers. They are also familiar with local beliefs and regulations concerning protected areas of the environment, as well as protected plant and animal species, rules of access to natural resources, the duration of rights of use, enforcement of access and usage regulations, as well as the individual vs. community ownership of land and forest.

3.5.3. Semi-structured interviews

The main criterion chosen for data collection methods for this study is that it should be oral, to conform to the cultural norm of indigenous society and is also most suitable for this case study design. Scholars have argued that the interview is one of the most popular methods of collecting qualitative data in the case study designed research (Merriam, 1991; Simons, 2009; Cohen et al.

2011; Rule & John 2011) and culturally fits with indigenous people. According to Seidman (1998:4), the interview is the best method to find out things that cannot be directly observed, and for understanding the meaning people put to their experience. Interview has been defined as a purposeful conversation, usually between two people (Chilisa 2012:204) and it can be comprised of unstructured, semi-structured and/or structured questions.

This case study encompasses semi-structured interviews with open- ended questions as a primary data-gathering source used to help construct the participants' perspectives regarding the research questions. According to Chilisa (2012:42) semi-structured interviews are focused interviews that contain questions as a guide. In other words, semi-structured interviews begin with a predetermined set of questions, but allow some latitude for interviewees to include their agendas within the breadth of relevance of the question. In this way, the researcher is able to adjust and respond to the situation at hand, to the emerging worldviews of the interviewee and to the new ideas on the topic (Merriam, 1991:74) that evolve during the interview. Moreover, the participants were allowed to air their views freely on how they use IK in their everyday life and how it could be used to support EE. The data provided a rich and in-depth insight appropriate to answer the main research question that was being investigated.

Interviews were recorded on audio recording and notes were taken to highlight important points. Following the interview, a transcription of the tape recordings was done as soon as possible after the case visit, both to maximise recall and to facilitate follow-up visits so as to fill gaps in the data.

However, it was anticipated that most traditional leaders and indigenous elders are limited in terms of their proficiency in English. Therefore, they were asked and encouraged to answer in Oshiwambo during the interviews. Brislin's forward–backward translation procedure was used. The researcher himself translated the questions from English to Oshiwambo and they were reviewed by two language teachers. This procedure was reversed (from Oshiwambo to English and then back to Oshiwambo) during the transcription process.

3.6. Data analysis

The preceding sections have explained where and how data were gathered using semi-structured interviews and field notes. However, once the data has been collected it has to be analysed. Yet

separating data collection from data analysis is problematic because it suggests that these two processes work in a linear way while they do not. According to Merriam (1999:123), "the process of data collection and analysis is recursive and dynamic". Like the rest of the research design, data analysis design is an iterative process that continues throughout the research. It occurs simultaneously (Merriam, 1991:123) and concurrently with the research question, theoretical assumptions of the researcher, methodological approach and data collection methods. But the assumption held here is that once data collection is finalised, data analysis is more intensive. Therefore, it was imperative for the researcher to consider the method or methods that was going to be used to analyse the final product of data.

The research question provides the scaffolding for the investigation and the cornerstone for the analysis of the data provided (Anfara, Brown & Mangione, 2002:30). The research question for this study seeks to discover ways in which IK can support EE in rural schools. The discovery nature of this research question (which attempts to explain and describe how IK can support EE by studying two rural schools in depth) justifies the use of case study design. Like other research designs that use methods of collecting qualitative data, a case study attempts to understand a phenomenon in its natural settings (Yin, 2009:18). This understanding is also aligned with an interpretive paradigm that is not geared to identifying causes but provides a different way to explain and describe social phenomenon (Suter, 2011:34).

According to Yin (2009:126), data analysis is a process of examining, categorising, tabulating, testing or otherwise recommending evidence, to draw an empirically based conclusion. In other words data analysis is a process of "breaking up" the data into manageable themes, patterns, trends and relationships (Mouton, 2001:108) so that the researcher and others can meaningfully understand various aspects of data.

Analysing case study evidences is a challenging task for various reasons. Generally, case studies generate large amounts of data using multiple sources (Hancock & Hancock, 2006:62). This mountain of information from transcribed interviews and other data requires a systematic process to synthesise findings in order to make sense of what has been learned. Another problem is that the researchers are usually unsure of what is to be discovered and what or whom to concentrate on (Merriam, 1999:124). This could explain Yin's (2009:126) observation that many researchers

start the case studies without having precise ideas of how data will be analysed. Moreover, analysing case study is one of the least developed strategies (Yin 2009:126). Yet case study requires a clear plan on how data is processed and analysed, and how inferences are derived from the story presented (Gerring, 2007:6). In this study the thematic approach to data analysis was used.

3.6.1. Thematic analysis

Thematic analysis has been identified as an appropriate method to analyse transcribed texts of interviews. Thematic analysis is a method of analysing qualitative data by "identifying analysing and reporting patterns (themes) within data" (Braun & Clarke, 2006:6). Fereday and Muir-Cochrane, (2008:82) echo similar sentiments by stating that thematic analysis seeks to unearth salient themes that emerge as being important to the description of the phenomenon. It moves beyond counting explicit words or phrases and focuses on identifying and describing both implicit and explicit ideas within the data, that is, themes (Alhojailan, 2012:10). A theme "captures something important about the data in relation to the research question and represents some level of patterned response or meaning within the data set" (Braun & Clarke 2006:82).

Braun & Clarke (2006: 81) explain that thematic analysis can be an essentialist or realist method, which reports experiences, meanings and the reality of participants. Alternatively, it can be a constructionist method, which examines the ways in which events, realities, meanings, experiences and so on are the effects of a range of discourses operating within society. The latter is consistent with interpretive assumption informing this study that is not geared to identifying causes but provides a different way to explain social phenomena. Therefore, the intuition is that thematic analysis entails close attention to individuals thus providing insight into the cultural beliefs and values that instill powerful experiences and motivations of indigenous people and how they make sense of, and respond to their environment. Moreover, locating themes would most readily honour the concept of letting the participants' words and intention emerge as intact as possible.

In the context of this study, Braun and Clarke's step-by-step guide of conducting thematic analysis was used. The initial step involves familiarising oneself with the data through transcribing, reading and rereading the transcriptions and segmenting data into manageable units

for analysis. Where interviews were in a language other than English, the original dialogue was translated into English. The second step involves generating initial codes from the data (see Appendix A). The purpose of coding is to make connections between different parts of data and is derived from participants' responses (Alhojailan, 2012:12). The generating and categorizing codes utilizes both inductive (data driven) and deductive (informed by interpretive theory and prior research findings) approaches.

The third step is searching for themes and this involves sorting the different codes into potential themes. The forth step involves reviewing and refining the candidate themes. At this stage validity of individual themes in relation to data should be set. The fifth step can only be done once satisfactory thematic map of the data has been created. It consists of defining and naming themes that will be presented and analyses the data within them (Braun and Clarke, 2006). The final step is producing the report accompanied by enough data extracted which captures the essence of main points.

3.7. Establishing trustworthiness

The concept of trustworthiness is chosen deliberately as an alternative to reliability and validity. Reliability is the extent to which a test or procedure produces similar results under the same or similar circumstances (Bell in Bush, 2002:60) and validity is the extent to which results represent what is claimed to be. However, these definitions are informed by quantitative methods where replication and generalisation are applicable. This study is not aiming for representativeness and generalisation (Denzin, 1989), but to get thick descriptions of teachers', advisory teachers and traditional leaders' views on how IK can be used to advance EE learning. It constitutes semi-structured interviews that are subjected to multiple interpretations of the qualitative data. Equally, if observation data exists in the form of verbal description, reliability cannot be easily measured (Bush, 2002:64).

Nevertheless, legitimacy and relevance of data will be achieved through transferability, credibility, dependability, and confirmability. According to Guba cited in Rule & John (2011:107), transferability is an alternative to generalisation which has roots in quantitative data research. Credibility on the other hand refers to the extent to which a case study has covered the fullest essence of the case reality. In other words credibility is ensured through "fidelity to real

life, context and situation specific, authenticity, comprehensiveness, detail, honesty, depth of responses and meaningfulness to the respondent" (Cohen et al. 2011:149).

Dependability according to Guba is a replacement for reliability (Rule & John, 2011:107). It rejects the positivist notion of replication to focus on rigour and coherence of research methods used in generating the data. Finally, confirmability is taken as a way of addressing concerns about the influences of the researcher and bias towards the study (Rule & John, 2011:107). In this study confirmability is achieved through "honesty, depth, richness and scope of the data obtained, the participants approached, the extend of triangulation and the objectivity of the researcher" (Winter cited in Cohen et al. 2011:179). Triangulation is the method of comparing different sources of data in order to enhance participant perspectives in research (Stringer, 2004:18). Triangulation is achieved by using multiple data sources to make inferences and compare different sources of data. Member checking involving research participants as a process of verification and were possible a critical peer checking is assumed.

3.8. Ethical considerations

According to Remenyi, Swan, and Van Den Assem (2011:1) ethics deals with issues of human conduct allied to a sense of what is right and what is wrong and thus it may be viewed as society's code of moral conduct. It includes all codes of conduct that are concerned with the protection of the researched from physical, mental and psychological harm (Chilisa, 2012:86). Ethical issues arise in all aspects of research, and the research methods proposed here also face ethical requirements. Therefore the research proposal for this study was submitted to the University of Stellenbosch's ethical committee for ethical clearance.

In addition, a letter was written to the regional education director and principals of schools selected for this study, requesting permission to conduct this research at their schools. Interviews were done only after informed consent has been given by interviewees. They were informed about the purpose of the study, the anticipated consequences of the research, the identity of the funder and sponsor, the anticipated uses of the material gathered and the possible benefit of the investigation (Chilisa, 2012:180). Moreover, the assumption is that the researched individuals may disclose sensitive information exposing, themselves. Therefore, anonymity of data and confidentiality is guaranteed and participants were allowed to withdraw from the research at any

stage if they felt uncomfortable. Participants were requested to define their roles in the community during the course of the research.

3.9. Chapter summary

In this chapter, the author describes the philosophical and methodological assumption guiding this study. The author begins by identifying four main research approaches; positivism, post positivism, interpretive/constructivist and critical theory. This was necessary because educational researches are either implicitly or explicitly conducted within a framework of theoretical assumption. Based on the exploratory nature of this research question and the fact that IK is culturally embedded, an interpretive paradigm is adopted as an appropriate methodology and design to collect field data to address the identified research issues.

Turnbull (1997: 552) notion of "situated knowledge" which recognises the differences between IK and Western Science, yet concerned with ways to merge them, has been identified as the main theoretical assumption underpinning this study. Within the framework of interpretive paradigms and in relation to the various natures of IK and EE, a case study design employing methods of collecting qualitative data is justified. In line with a case study design, the author went forth to give a brief description of the research site and research participants. Both the research site and research participants were chosen using purposive sampling. The research participants are traditional leaders, advisory teachers and teachers. The data collection method is primarily semi-structured interviews (and a field journal) with open ended questions to allow the participants to set the agenda. The transcribed texts of interviews were analysed thematically. In the final part of the chapter, the researcher introduced readers to various means that were used to establish the trustworthiness of the research endeavour as well as ethical issues that were taken into consideration during the research process.

Chapter 4

Presentation and analysis of findings

4.1.   Introduction

In the previous methodology chapter, the researcher identified and discussed the methods of gathering data, the analytical strategies, and the methods of establishing trustworthiness and ethical procedures that were used in this study. This chapter presents the findings, the analysis, and the interpretation of the data that were gathered during the fieldwork. The current study entailed an investigation into the ways in which IK could be used to support EE in rural schools. Firstly, the chapter starts of by providing a detailed account of the historical, the social, and the cultural context in which the teachers and the students concerned interacted when teaching and learning about their environment. The second part of the current chapter focuses on the presentation, and on the analysis, of data, in line with the above-mentioned research question(s). The data are organise and presented in five main categories.

The data were mainly collected using interviews. The interviews were semi-structured, with up to ten open-ended questions allowing the individuals to respond spontaneously, and to probe salient issues surrounding IK and EE. The interview questions were formulated by the researcher in relation to the main research questions, after which they were submitted to the supervisor for scrutiny. After the questions had been scrutinised and revised, the final interview schedules for both groups were compiled (see Appendix B and C). The interview questions for the traditional leaders were later translated from English into Oshiwambo by the researcher, with the help of two language teachers. The reason for the interview questions being translated into a local language was because it was assumed that the traditional leaders concerned were not fluent in English.

As was described in the previous chapter, the researcher planned to conduct one-on-one interviews with two Life Sciences teachers (one from each school), with one advisory Life Sciences teacher, and with two traditional leaders. However, during the preliminary visit to schools A and B, it emerged that each school had two Life Sciences teachers, who requested to be interviewed together. The researcher implemented this change, because it was thought that

doing so would reveal a great deal about their respective perspectives on the subject. The Life Sciences advisory teacher, who had initially refused to participate in the interview, because she thought that she knew too little about IK, also opted for being interviewed along with her colleague, who coordinated a newly introduced Traditional Life Skills Programme in the schools. Accordingly, the two traditional leaders were interviewed separately, whereas both the teachers (4) and the advisory teachers (2) were interviewed in pairs. The names of the schools, of the teachers, and of the advisory teachers who participated in this study have not been revealed, so as to protect their identities. Instead, coding was used for those involved: Teacher (T) 1, 2, 3, and 4; Advisory Teacher (AT) 1 and 2; and Traditional Leader (TL) 1 and 2. This was used to identify the participants concerned, with the schools involved being identified as schools A and B. In the next section, the historical, social and cultural set-up of the schools is discussed.

4. 2. The historical, social and cultural set-up of the schools

The information provided here is based on the researcher's observations made during the data collection, and on the basis of the school development plan (SDP) (see appendix H). In the case of School B, which failed to provide the researcher with either an SDP, or a detailed background of the school, the researcher could only describe his personal encounters with those involved. Figure 4.1 below shows the location of the schools concerned.
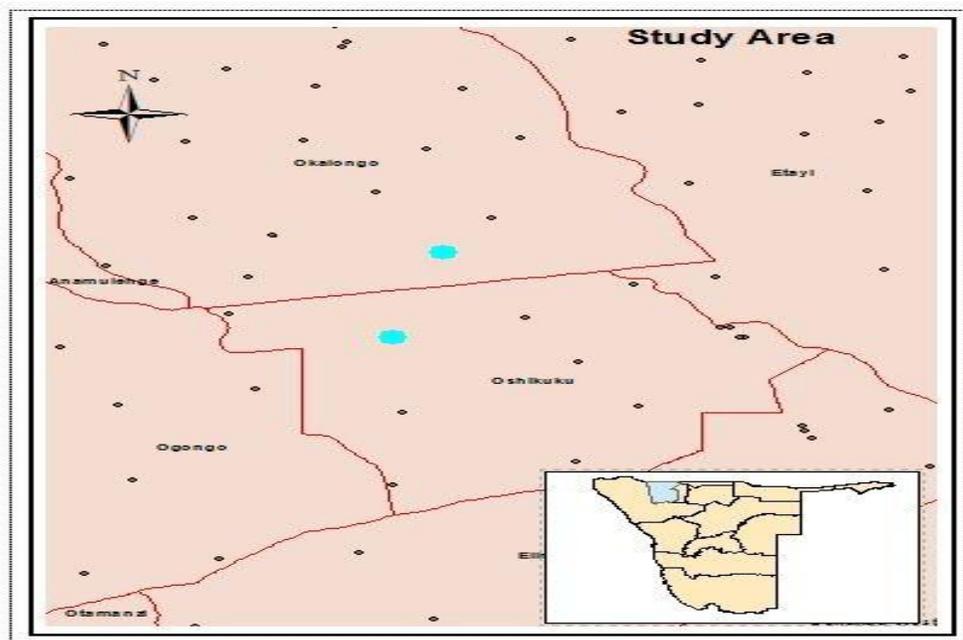

Figure 4.1: The location of the schools

4.2.1. School A

School A was situated approximately 17 km north-west of Oshikuku, which was the nearest town. It was established in 1983 by the community members, as the children had previously had to travel long distances to school. The school started with 51 Standard One learners, and two teachers. The learners were taught in a shed that was erected by the community members. The size of the shed was believed to have been 15 m × 10 m, with the walls made of sticks, and with the roof also being made of sticks, which were covered with reeds and grasses. The roof was not properly covered, leading the young learners to suffer in the cold and rain.

The school has since expanded, and, in 1999, it was upgraded from a primary school (catering for Grades 1 to 7) to a combined school (catering for Grades 1 to 10). At the time of this study, the school had about 276 learners, 17 teachers, a secretary, and two institutional workers. The teachers, the secretary, and the institutional workers were appointed by the school board (SB), although their professional development and their salaries were the responsibility of the MoE. All the teachers were qualified, and they taught in their area(s) of specialisation.

A variety of co-curricular programmes before, during and after the school day were offered to students, including instruction on HIV/AIDS, remedial teaching, and sports activities, which mostly consisted of soccer, netball, volleyball, and athletics. An informal interview that was conducted with the Agriculture and Life Sciences teacher revealed that the learners were also involved in gardening and fish farming as part of their continuous assessment. However, at the time that the researcher visited the school, the garden was empty, and without any sign that it had been used. The fish, which were mainly tilapia, were kept in a small pond in the corner of the schoolyard. The fish formed part of the community-based fish farming programme of the Ministry of Fisheries and Marine Resources (MFMR). In addition, the school buildings were surrounded with beautiful trees (see Fig. 4.2 below) that provided the learners with shade in which to play during break time.

In terms of the infrastructure, as can be observed in Figure 4.2 below, the school had permanent structures, including 11 classrooms, three storerooms, which were used as staffrooms, and ten toilets (fitted with a pit latrine) that were shared by the teachers and the learners. Most of the structures were equipped with electricity. In addition, a photocopier machine, two computers (of which one was out of order), and a printer were kept in the principal's office.

Fig. 4.2: Part of the school infrastructure at School A

In 2002, for the first time, Grade 10 learners wrote the national examination for the Junior Secondary Certificate (JSC), in which they achieved satisfactory results. However, during the six years prior to the current study, the JSC results had been disappointing, with the exception of 2009 and 2012, in which years at least more than 50% of the learners met the requirements to enable them to proceed to Grade 11. This high failure rate among the learners could be blamed on some of the following challenges:

- the lack of professional ethics among some of the teachers;

- the parental lack of understanding regarding educational matters;

- the need for an additional two classrooms, for an administration block, for housing for the teachers, for a laboratory, and for a library building;

- the fact that many of the learners were orphans and vulnerable children, who received little support from home;

- the failure of the teachers to implement the learning support programme; and

- the low amount of income that was received from the community, which hampered the school in buying in additional resources.(see appendix H attached)

The above-mentioned challenges had had several other implications for the school. For instance, the teachers tended to spend a great deal of time commuting every morning to school from the nearest towns where they either stayed with their relatives, or rented accommodation, because there was none near the school. During the rainy season, the school was usually inaccessible by car. As a result, the teachers and the learners had to cross large, ephemeral watercourses (*oshana*) to reach the school. In the process, much teaching time and energy was wasted. Sometimes the school was completely closed down, until the water level subsided. Due to these harsh working conditions, the teachers received a monthly incentive of N$1150 as part of MoE initiative to encourage qualified teachers to move to, and work in, remote areas of the country. However, the teachers continued to seek transfers to urban schools, which might have been due to the incentive not improving their working conditions. In particular, School A had lost six qualified teachers (including the current researcher) due to transfers that took place between 2009 and 2013.

4.2.2. School B
School B was also located in a village that was 8 km south-west of School A. The school was about 15 km west of Oshikuku, and about 1 km from the C46 tarred road. The historical background of School B, as given here, is quite sketchy, because, when the researcher visited the school, the principal was on leave, attending a political congress in Swakopmund. Though her office was open, the head of department (HoD) concerned could not locate the file in which the historical background information of the school was kept. Figure 4.3 below indicates part of the infrastructure at School B.

Fig. 4.3: Part of the school infrastructure at School B

However, according to the available information, the school first opened in the 1970s to provide primary education to learners in the community. Although it started with only one Sub A class, at the time of the study, the school had had to be extended into a combined school (consisting of a primary and a junior secondary phase), with an enrolment of about 367 learners, 14 teachers, a secretary, and two institutional workers. The school had 12 permanent classroom structures, four shaded areas, a cottage, and five toilets (fitted with a pit latrine). The school was also equipped with a photocopier machine, a computer, and three printers, which were kept in the principal's and the secretary's offices.

Although schools tend to be unique organisations, with different needs and challenges, the two schools described above were quite similar, in terms of their social and cultural setting. Both of the schools were situated in rural areas within the jurisdiction of the Uukwambi traditional area. The majority of the learners at the two schools came from a previously, and indeed a currently, disadvantaged rural community. Most of the rural community members were pensioners, or unemployed, together with students and youngsters, all of whom depended heavily on livestock and crop farming for food production. The learners were undoubtedly accustomed to performing such domestic and traditional agricultural chores as looking after livestock, preparing food, and growing, weeding and harvesting crops and fruits in their environment, although they also

practised some elements of a modern culture. In short, their livelihood depends heavily on natural environment for food, medicinal plants, shelter and income generation. Therefore, the natural environment is critical resource for their survival.

4.3.   Findings and Discussions

The data are discussed under five main categories, namely (1) the participants' demographic information; (2) the participants' perception and understanding of the terms IK and EE; (3) the participants' understandings of, and approaches to, the integration of IK into EE; (4) existing IK and EE practices; and (5) challenges to the integration of IK into EE. Figure 4.4 below is a representation of the five main categories used to organise the data.
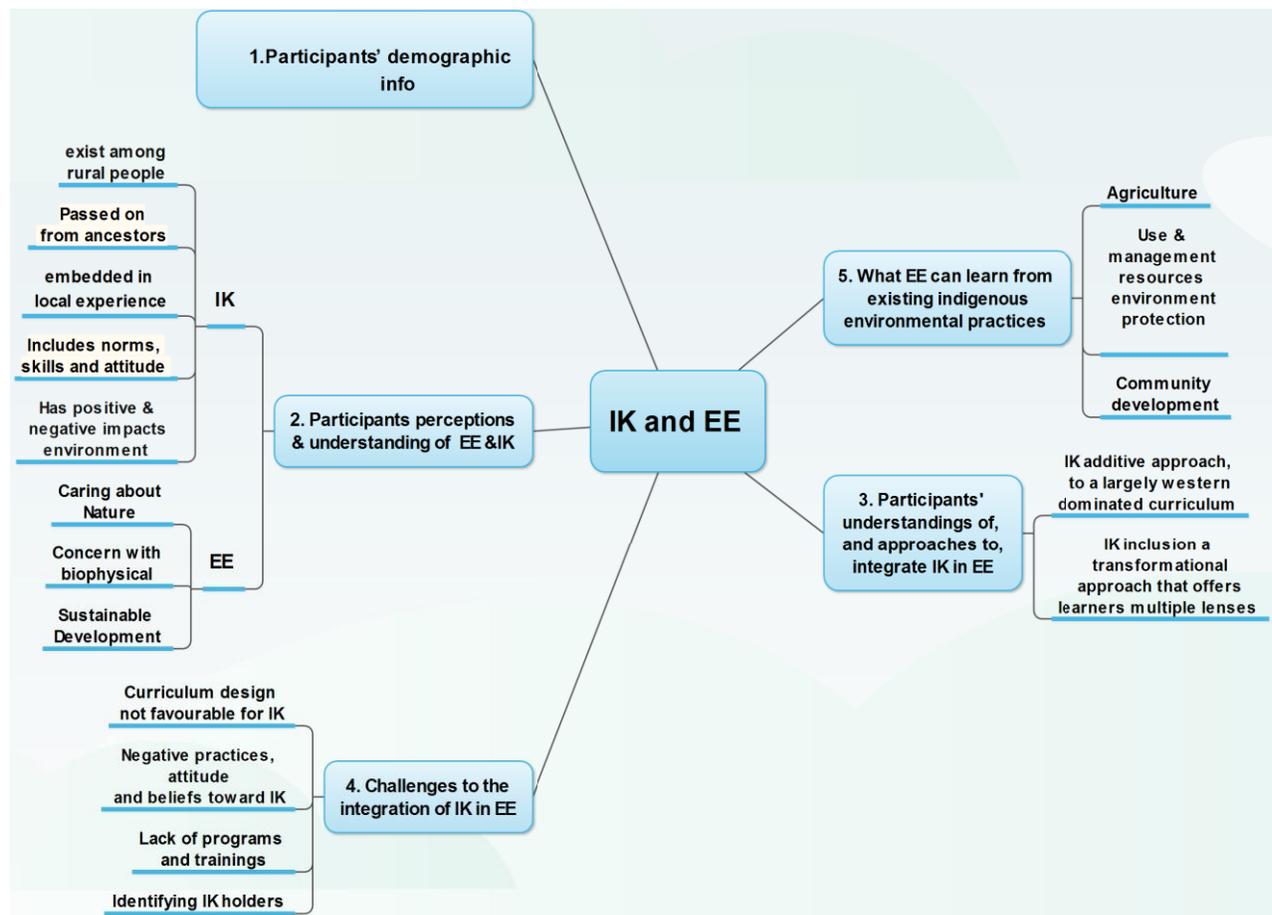
Fig. 4.4: A representation of the five main categories used to organise the data

4.3.1. *Participants' demographic information*

The demographic information regarding the teachers, the advisory teachers, and the traditional leaders who participated in this study shows that those involved differed significantly in terms of

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their age, their experiences, and their roles and responsibility in the community. For instance, Traditional Leader 1 (TL1) was believed to be in his 70s at the time of the study, and had been the head of the Uukwambi Traditional Authority (UTA) since 1985, after taking over from his father, who died in 1982. He was one of the 49 government-recognised traditional leaders. As a recognised traditional leader, he had been given a government car (Toyota Hilux 3.0 VVT-i double cab) to enable him to carry out his traditional responsibilities of administering the affairs of the entire Uukwambi community.

The Traditional Leader 2 (TL2) was recommended to the researcher by the TL1, due to her vast experience in terms of traditional matters. She was a 57-year-old open- minded woman, who had started serving the UTA in 1992 as secretary, and who had since become a senior traditional leader. During her time in the office of the UTA, she had received extensive training, including in the form of a university-level course on basic law. She also presided over the Uukwambi traditional, or community, court, and, during traditional ceremonies, served as a judge.

The teachers and the advisory teachers had varying amounts of teaching experience, ranging from three years to more than 30 years. However, they shared certain common characteristics, such as coming from the same cultural and religious background. They were directly involved in implementing the Life Sciences curriculum, and they should (in one way or another) have been exposed to both IK and EE through their integration with the community, through their professional development, and through their primary, secondary, and tertiary education. They were all indigenous Oshiwambo speakers, who had grown up in a rural community. Although, at the time of the study, some were staying in such towns as Oshikuku and Outapi, they still all had ties to their rural communities. Since they were involved in implementing EE in a disadvantaged school, they were familiar with most of the traditional practices concerning their socio-economic and cultural environment. Two of the participants explained their relationship to the environment and to their cultural upbringing in the following way:

> I am from [name of the village withheld] – that is where I was born. I was also brought up there by my grandfather, and, just like other children, I have been herding the cattle and goats. We also used to go hunting for the rabbits with the other boys during the [i.e. at a] tender age.

(T1:19/07/13)

I just grew up as a normal Owambo girl, doing all the chores in the house, but I went to school, covering up to 7 to 8 kilometres when going to school, and footing [it] was just something that we were used to.

(AT1:20/07/2013)

Both the teachers and the advisory teachers were full-time, fully qualified secondary school teachers who were in possession of a Basic Education Teacher Diploma (BETD), or a higher qualification from an institution of higher learning. The BETD (which the current researcher also studied) is a three-year teachers' training programme, which was founded on learner-centred education (LCE) principles, and which was formally offered at colleges of education. The former teachers' colleges have since been merged with the University of Namibia, in a move that poses concern for the integration of IK in education. This is especially so as most universities in Africa have not yet made the fundamental changes that are required to successfully integrate IK into their curricula (Schafer, Ezirim, Gamurorwa, Ntsonyane, Phiri, Sagnia, & Bairu, 2004:61). Instead, they continue to ascribe to discourses of modernisation, and to those of neo-liberal, universal science education, as well as to international standards that are not compatible with IK worldviews.

4.3.2. *Participants' perceptions and understandings of the terms 'environmental education' and 'indigenous knowledge'*

The concepts IK and EE are problematic ones to most educators. When the researcher initially visited the schools and the teacher resource centre to make the required appointments for the interviews and to issue the necessary consent forms, some of the respondents were found to be reluctant to participate in the study. One teacher claimed that, although he taught Life Sciences, he was not aware of the term 'IK'. He was also sceptical of whether the Life Sciences had any relationship with EE. The Life Sciences advisory teacher also expressed similar concerns, stating that Life Sciences had changed, and that it no longer focused entirely on EE, as it had done in the past. She claimed that the Life Sciences content had been restructured in the direction of Biology content. As a result, the researcher found it necessary to spend some time explaining about, and giving some information on, EE and IK to the study participants. Once a consensus had been reached as to the meaning of the two concepts, the appointments for the interviews were arranged.

As IK is an unfamiliar concept (though its practices are familiar) in terms of the Namibian curriculum, it is understandable that some participants find it difficult to understand. Likewise,

there is no such subject as EE within the Namibian schooling system. The lack of such a distinctive use of the term shows why teachers find it difficult to express their views about it, and to relate it to their day-to-day practices.

In this section, the researcher describes the participants' perceptions and understandings regarding IK and EE. The participants' perceptions, understandings, and their attitudes towards IK and EE are regarded as being "vital to knowledge harmonization and hybridization" (Shizha, 2005:111). As well as devoting two questions to this category, any other discourse in the interview transcripts reflecting the same thread of meaning was identified. The participants were asked: (1) to define the terms 'IK' and 'EE' from their own perspectives; and (2) to indicate whether there was any relationship between IK and EE. These questions were necessary to ask to establish whether there was a common understanding of the two concepts among the participants.

4.3.2.1. *Indigenous knowledge*

Although most participants initially struggled with the concept, they generally agreed that the bases for IK were local ways of knowing, seeing, and thinking that were passed down (orally) from generation to generation, outside the arena of formal education. Such knowledge results from a common understanding, and the long-standing experience of, the local environment in various areas, such as agriculture and natural resource management, among many other categories.

Some of the participants expressed their understanding of the term as follows:

> ... an understanding of experiences that is [sic] from the **local environment**, whereby a person is just learning **through observing** and looking at the way [in which] the local people behave. The way they act, the way they say things, and such knowledge is not from elsewhere, it's just from within the environment where the person is living, and also the **knowledge where** [that] **the person gets from ancestors** of those people – [what they] have been doing, and how those people have been doing things.
>
> (T4:21/07/2013)
>
> Indigenous knowledge, this is the knowledge that **exists before education**. We are talking about the **skills,** we are talking about the **values**, and we are talking about the **attitude** that our people have before education.
>
> (AT2:20/07/2013)

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In Africa, we are having our own **way of science**. Our forefathers in the past, they have used their **common understanding** … Let me say they use[d] to estimate how the harvest will [i.e. would] be. As we said earlier ... they can even look at the flowers or the birds that are flying [overhead] to tell that this year we are expecting a lot or … not. For example … we are having people who can heal certain diseases, but they were not educated on it. That is just an **African way of science**, and they have **inherited** [it] ... from people who are gone already.

(T1:19/07/2013)

I understand indigenous knowledge as knowledge that we have acquired from our parents … it is … education from our parents. If we talk about **education, it starts at home**, **from the parents** and … **the community** where we live. It includes **norms**; it includes the **way the resources are used** … and the **attitude** … but mainly the **skills** on [i.e. as to] how to handle things, or how to use natural resources.

(AT1:20/07/2013)

Notably, the advisory teachers (AT1 & AT2) depicted a much broader conception of IK compared to how the teachers conceived it, and to how the term is defined in most academic literatures. According to the former, IK encompasses traditional values, norms, attitudes, and skills that are learned at home.

4.3.2.2. Environmental education

When the respondents were asked to give their understanding of EE, only four (4) of the six (6) respondents attempted to do so. Yet, those who attempted to define EE only identified the sustainable use of natural resources, the creation of awareness (the education that people had about their environment), and conservation as being the main concerns of EE. If one looks at the rationale and at the aims of EE education, as they are illustrated in the Life Sciences syllabus (see the insert of the Life Sciences rationale and aim below), in addition to the promotion of awareness and conservation, there are also values, attitudes, scientific skills, and democratic principles that are consistent with the idea of sustainable development. However, it seems that the participants were not well acquainted with the basics concerned, although they were involved with implementing Life Sciences education at schools, or at a regional level.

Some of the participants expressed the following regarding EE:

Environmental education, I think this is more on **sustainable development** or it is more on how can we **take care of our environment** … or preserve it I did Environmental Economics at the university, but that was more on how can we [i.e. we can] use **resources sustainably.**

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We were taught about the environment, how to take care of our environment, to beautify our environment and our surroundings by growing some trees, and how to **look after the natural resources**. We also looked at other things: important product which we can get from the trees which surround us.

[In] environmental education you are **educating yourself**, **or you are being educated** about your environment where you live. Of course, when we are talking about the environment, then we have to think about the rainfall, the water, as well as the land. We also have to think of the natural resources that we have there – how we are taking care of them **in a sustainable way** so that they will not be used up.

Environmental education – I can say this one is just a way of **educating people about the environments** in which they live. This includes ... how they will take care of their environments and the s**ustainable use of existing or available resources**, so that is my view on the two topics.

As can be seen from the above responses, the participants were, to a certain extent, aware of the term 'EE', but had a very limited understanding of the concept and its implications. The participants considered EE as being limited to teaching and learning about such biophysical issues as pollution, deforestation, and the sustainable use of natural resources. It seems that none of the participants considered social, economic, and political issues as being part of EE. The only economic issue that emerged from the data had to do with agriculture. Perhaps this was so because most of the participants (the Life Sciences teachers/ advisory teacher) were teaching, or had been trained to teach, Agriculture. Else, it probably was because agriculture has a biophysical component.

This conceptual confusion can be blamed on the type of language that is used in the Natural Sciences curriculum (see insert below). The curriculum persistently emphasises the importance of helping learners to develop a holistic understanding of the biophysical world, as well as of the scientific knowledge, and the relevant skills, values, and attitudes that are required for the maintenance of sustainable resources. The seemingly uncriticised absence of social, economic and political issues from the curriculum documents, especially in the Natural Sciences curricula, tend to cause concern.

RATIONALE AND AIMS

Learning experiences in the natural science area are focused upon promoting teaching and learning for understanding. Namibia, like most African countries, is rich in natural resources. The exploration of these resources requires scientific knowledge and relevant skills. The acquisition of scientific knowledge and skills presents itself as a prerequisite for a progressive national economy and improved standard of life for our people. Thus it is important for our learners to acquire knowledge and skills which will foster their understanding of the interaction of human beings and the environment in order to satisfy human needs. It must be understood that the physical and biological world around us is quite complex and therefore needs to be understood in a holistic manner by the society in order to sustain the natural resources.

The sustainability of our natural resources, however, requires advanced technology through the efficient and effective usage of equipment, materials and processes. Modern technology is required in order to assist our learners and society to solve problems through planning, design, realisation, and evaluation of activities and goals. The main aim of the syllabi in the natural science area is therefore to provide essential scientific background for our learners with the hope of producing the much-needed scientists for the country. The Namibian society needs to be scientifically literate if it is to cope with challenges of appropriate global technology and other requirements.

The subject Life Science within the natural science area promotes the following aims in the curriculum guide:

2.1 Knowledge with Understanding

• develop knowledge, understanding, creativity, practical and experimental skills as a solid foundation for academic training to prepare learners for creative and meaningful adult life

• help learners develop self-confidence, self-knowledge and understanding of the world in which they live, through meaningful scientific activities

2.2 Values and Attitudes

• develop a sense of responsibility towards the environment, relating scientific practices to sustainable use of natural resources

• demonstrate desirable behavioural patterns and frame of mind in interacting with the environment in a manner that is protective, preserving and nurturing

• develop attitudes and practices, further knowledge and activities that promote the physical and mental health of the society

• develop and enhance respect for, understanding of, and tolerance of other people's beliefs, cultures and ways of life

2.3 Scientific Skills

• develop a lively, questioning, appreciative and creative intellect to enable learners to discuss issues rationally, to make careful observations and analysis, to think scientifically, to solve problems and apply these skills to tasks

• promote Information Communication Technology (ICT) as a tool to enhance understanding of the learning content

2.4 Democratic Principles

• promote equality of opportunity for females and males, enabling both sexes to participate equally and fully in all spheres of society and fields of employment

• lay a foundation for informed and responsible attitudes and choices towards the balance of population growth, ecological sustainability, and the quality of life for all citizens of Namibia

In addition, the term 'EE' is rarely used and explained within the education arena in Namibia. Though most participants might be familiar with the term itself, they have not yet comprehended it to its fullest degree. Therefore, it seems obvious that they lack insight into the complexity and the multidimensionality of EE, as well as into the underlying theoretical and scientific views of the environment.

The fact that the curriculum is not explicit on EE is challenging. Some participants were even less convinced that they taught EE as a cross-curricular subject.

> [I]n our curriculum, we do not really have that [EE], but if I can recall back when I was in Grade 1, that was Sub A at that time … we were having that subject on environment but it was in [the] vernacular … called '*omudhingolokolongo*' (environmental education) … but now we do not have that subject in our curriculum, but the topics are integrated in some of the subjects. Like in Life Sciences, we can come across **some** topics which are more related to [the] environment … [i]n Agriculture and in Geography … we also learn about the environment.

(T1:19/07/2013)

The above-quoted participant felt that he was not directly involved with EE. Rather, he only taught some of the topics concerned, which were integrated into the subjects that he taught. However, the participant view is understandable given that EE topics are taught across the curriculum.

4.3.3. *Participants' understandings of, and approaches to, the integration of indigenous knowledge into environmental education*

In the previous chapter, the researcher argued that integrating IK into EE is a collective process, which requires a coalescence of interested, informed, and committed stakeholders in education. The teachers, the advisory teachers, and the traditional leaders who participated in this study were among the important stakeholders who would be responsible for informing any successful curriculum innovation within the Namibian context. This section provides some of the participants' views regarding the integration of IK into EE.

When they were asked about their view of the infusion of IK into EE, all the participants agreed that the integration of IK into the school curriculum was necessary. However, the participants did not wholeheartedly endorse the same approach as to why and how the infusion of IK should be

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done. Generally, the participants tended to embrace the integration of IK on principled grounds (e.g. in terms of the right to cultural identity), but some pragmatic reasons (e.g. the successful contribution made by IK) were also identified in the data. The two approaches discussed here are located within the two competing perspectives and worldviews as to whether science (education) is universal, or multicultural, as was discussed in Chapter 2.

To make sense of the different views that the participants had regarding the integration of IK into EE, a typology describing four different approaches to the inclusion of multicultural perspectives in the classroom, which has been adopted from Banks, as cited in Kanu (2005:50), is used: (a) the contributions approach, in terms of which the focus is on teaching students about the contributions that are made by each cultural group; (b) the additive approach, in terms of which content, concepts, and perspectives from other cultures are occasionally added to a curriculum that still remains largely Eurocentric; (c) the transformational approach, in terms of which curriculum topics are taught from multiple perspectives; and (d) the social action approach, which is based on the transformational approach, in terms of which the students are encouraged to take action for social change (Kanu, 2005:50).

The understandings and the approaches that could be drawn from the participants' interview responses prominently revolved around the second category, with only a few of the statements being able to be placed in the third category. None of the responses could be assigned to the first category, perhaps because the participants concerned lived within a single cultural group, in a homogenous society. Likewise, the fourth category was not the focus of the participants' responses. However, the fourth category could probably have been addressed much more effectively if classroom observations and learners' interviews had been carried out.

4.3.3.1. *IK integration as an additive approach, in respect of a largely Western-dominated curriculum*

Within the framework of the second category, 'additive approach', the participants also exhibited different perspectives on why local content, concepts, and perspectives were required in EE. The advisory teachers seemed to agree that the inclusion of IK in EE was important, as it would serve as an effective home-school communication vehicle and programme that would accommodate the parents, and which would allow for teachers and learners to learn from them.

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[We] need to engage with parents, more especially elders, who have matured knowledge about the environment. This will not only help our learners to know about their environment, but it will also expose our limited understanding about the environment we are living in. Also, integrating IK in education will give parents the opportunity to contribute to teaching and learning in school, because now parents are not really involved, because they don't understand things that we teach. But, as soon as their knowledge is included in the school, they will be able to contribute on what they know. They will even be helping learners with assignment[s] at home on that indigenous [knowledge].

(AT1:19/06/2013)

Furthermore, the participants, and more especially the traditional leaders, appeared to embrace the integrating of IK into education on the principled grounds of restoring the past, and maintaining cultural identity. The assumption is that the traditional way of learning, such as sitting around the fire and telling stories about the past, is gone, and that learners nowadays are unwilling to listen to the elders. Thus, the integrating of IK into schools would be likely to serve as a unique opportunity for restoring and validating the already marginalised IK. This would eventually tend to encourage the learners to learn more about, and to respect and to uphold, their culture and other indigenous perspectives that they have acquired from home. Accordingly, some of the participants involved expressed the following:

I think it [i.e. integrating IK] is important, because, if it is not integrated, where else can our children learn about their culture? Nowadays, our children do not listen to us any more. Who would believe you if you [were to] say [that] we are expecting minimal rainfall by just looking at some termite or aloe vera flowers? But, I think, if such information is given to children at school, they will believe it.

(TL2:14/06/2013)

I think [that] it is very much important to integrate it (IK), because most of the important skills we may learn from our parents, so that it doesn't [i.e. they don't] get lost. Because it seems [that] we don't really respect and acknowledge our own, be it knowledge or skills [that] we are having. So this seems to be overtaken by [the] Western way of doing things

(AT1:19/06/2013)

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… Now, since some technology came in, our indigenous knowledge is pressed down, and we might end up with the future generation not knowing anything about what happened in the past. So, some are quite essential. I mean the skills are essential in the society still. It is just a matter of upgrading them, maybe. But our learners don't really have that … [They] have not been taught in way[s] that they get to respect their values.

(AT2:19/06/2013)

The above verbatim accounts indicate that learning about IK is important, because it gives learners the opportunity to learn about their origins, and thus to maintain their cultural identity.

The participants also saw the LCE principles that form the cornerstone of the Namibian curriculum as being the reason for the integration of IK. One of the main principles of LCE is to use the learner's social context as a resource for teaching and learning instruction, thus making learning socially relevant (Kasanda, Lubben, Gaoseb, Kandjeo-Marenga, Kapenda & Campbell, 2005:1805). The learner's existing knowledge, skills, interest, and understanding that is derived from previous experience in and outside the school is usually used as a starting point for teaching and learning activities.

The following views, which were expressed by some of the participants, are consistent with the approach taken in terms of the LCE principles described above:

[W]e do not ignore indigenous knowledge in our lessons, or in our practice in schools. Because, like our subjects … Agriculture or Life Sciences, most of the topics which we teach the learners, they are more familiar. Even not in modern ways, but in traditional ways. That is why we have to ask them on [i.e. as to] their knowledges, [and] previous knowledge. When we talk about previous knowledge, in most cases we have to refer to the indigenous knowledge which they already know, or which they acquired from their parents, the way they are brought up, and that is why we have to refer [to it] before we introduce the modern.

(T2:19/07/2013)

IK is the foundation where [i.e. on which] we base our modern knowledge, because … before knowing commercial farming, you already knew that people do farming. You know already that, when you were a young boy, you used to look after cattle or goats, and that is farming. You knew already that we used to cultivate using our hoes, that is [the] traditional way of knowledge. That

is the way we use our traditional knowledge in farming, but commercial farming, you will now understand it more better, having already that knowledge that traditionally we use to farm like this, now this is just a kind of advancement, just advancing what we already know. That indigenous knowledge or that traditional knowledge that we have will help you now to understand more concepts in the advanced stage.

(T1:19/07/2013)

In the second extract above, T1 relates to the informal experience of learners as the basis on which modern agricultural methods can be advanced in school. The informal and rural learners' everyday experiences, such as the traditional methods of livestock rearing and crop cultivation, which learners bring to the classroom, are unquestionably related to IK, and form part of experiential learning. They are part of the community curriculum and, according to this teacher, such experiences are indeed important in helping learners "to understand more concepts in the advanced stage" (T1:19/07/2013), thus providing meaningful and relevant learning experiences.

4.3.3.2.IK inclusion as a transformational approach that offers learners multiple lenses

The transformational approach puts a very high premium on incorporating IK into EE. The approach assumes that understanding and integrating IK into practice will, ultimately, provide the learners with an opportunity to view the world from multiple perspectives. This means that incorporating IK into EE is not merely a remedy of the past, or some sort of moral obligation. Rather, it sets the tone for a learning environment that gives learners an opportunity to compare different knowledge systems, and to use different lenses for acquiring knowledge. Consequently, the learners will be able to make informed decisions that are drawn from different cultural perspectives, and they will be able to understand their own culture from a broader perspective. The transformational approach was exemplified in the following extract:

Yes, it is very important, with the idea that if we are integrating the two now. We are putting the knowledge together, the knowledge from where we live, and, of course now, the knowledge of the environment … the Western knowledge and the indigenous knowledge. Of course, it is very important to integrate them, because now we know from the other side, and we combine [it] with what we know already in our surroundings.

(T4:21/06/2013)

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The advisory teacher also expressed the possibility that including IK into EE could narrow the gap between school education and home education.

> If we do not cater for it [IK] in our curriculum, it means [that] ... there will be a gap between what children are taught at home and what learners are learning from school, because, at school, [it] is more of technology, and, from home, it is what learners are learning from parents, and these things – they should work together.

(AT1:19/06/2013)

The advisory teachers also saw that the parents' and elders' involvement in education, and in EE in particular, could enhance the teachers' and the learners' conceptual understanding of the environment. In terms of the above, one of them stated:

> We should also [be] bringing parents to school, and teach[ing] learners the traditional ways of caring [for] the environment, or preserving the natural resources, and this will also enhance our understanding of the environment.

(AT2:19/06/2013)

The participants felt that it was essential for the students to be taught a broad view of environment. It was felt that receiving such an education would, in the end, enable them to address the many environmental challenges in their community and to find a place in this pluralistic world.

Another response that revealed a transformative approach was expressed by a senior Life Sciences teacher, who also served as the Science HoD at his school (T1). Though not consistent with this approach, the participant noted that IK about plants could play a significant role in the life of those indigenous students who pursued a career in such scientific areas as medicine. The assumption was that the students would be able to use their local knowledge critically to come up with modern medical inventions.

> Now we have students studying, some of which [i.e. whom] are studying scientific-related courses, or [who are] studying to become scientists, while some are studying to become medical doctors. So, having that knowledge or that indigenous knowledge that some of the traditional trees have relative importance ... I think it will help them in their studies [and] in their researches,

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and also, for example, to come up with modern medicines using the indigenous knowledge and plants.

(T1:19/06/2013)

The above quotation also recognises that scientific inquiries are culturally situated, and that the cultural make-up of students can positively influence the conduct of their research. The above has bearing on Shizha's (2005:111) observation that the experiences that students bring from their homes and their communities are the bedrock on which the students are likely to develop a means of processing skills and concepts in the field of science.

4.3.4. Challenges to the integration of indigenous knowledge into environmental education

The participants generally agreed that the inclusion of local and IK in the curriculum is a positive approach towards dealing with problems that are related to parental involvement, to restoring the past, and to intellectual diversity, among others. However, integrating IK in a meaningful and representative form posits formidable implications for, and challenges to, education. This section discusses some of the issues to emerge from the participants' responses, which are perceived to pose challenges to the integration of IK into EE. These issues are embedded into the design of the curriculum, into teacher practices and attitudes, and into training and development, whereas others have to do with identifying IK holders.

4.3.4.1.   The curriculum as unfavourable for the integration of indigenous knowledge

A culturally appropriate curriculum design needs to follow the principles and the instructional methods that best will attain the desired outcomes. It was revealed that the integration of IK into EE is likely to face multiple challenges, stemming from the design of the curriculum. For instance, one advisory teacher expressed that there was too much detailed content in the curriculum to be covered. As a result, the teachers tended to ignore important information that derived from the learners' immediate environment, in order that they might complete the curriculum within the set amount of time.

More especially, the advisory teachers who served on curriculum and syllabus writing panels, and as the main source of teacher professional support, strongly felt that the curriculum was exam-driven. Consequently, the teachers were more concerned about helping the learners to pass

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their exams, and to proceed to the next grade, rather than to improve their livelihood. They even went on to complain that the exam- driven curriculum had resulted in competition among the schools, the teachers, and the learners. When they were asked whether IK was included in the curriculum, one of the advisory teachers explained:

> I think the syllabus or the curriculum is the one that guides teachers, and you know that exam-driven tendency, sort of, is still prevalent within [the] education system. Thus, if teachers could have … I mean some basic competencies that could cater for this [i.e. IK]. But the teaching [now] goes on because of this competition. And now they don't have much time to focus on [the] prior knowledge of the learners, and also to focus on [the] general information about a specific topic or concept. Now they are more focusing on just [the] examination, for [the] learners to know these facts, which really deprive learners from [i.e. of] getting general information.

(AT1:21/07/2013)

Similar views were shared as follows by yet another advisory teacher:

> But, because of this competition, truly, teachers are just teaching … I like saying teaching the subject, as if learners are going to be asked that subject if they go to America or when they go to England. Most teachers forget that learners are learning for life. I learn to use this knowledge in my life. I don't learn for examinations. It should make sense in my life. It should help me to grow. But if you are just teaching the subject, that means I am only teaching what the syllabus is telling me, and I should not add the practical, or the real-life, example that [the] learners need to know and [that] they need to apply in their life.

(AT2:21/07/2013)

The advisory teachers' observation given above revealed that the teachers tend to stick to what is considered to be important for the examinations. However, IK is not. Thus, such knowledge is not tested in the examinations, especially in the national examination at the end of each school phase. The national examination is highly centralised and bureaucratic. All roads lead to Windhoek, where all school examinations are set and marked in terms of a one-size-fits-all Western and scientific-oriented assessment system, with little, if any, room for local content. In

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other words, irrespective of the social or cultural context involved, the learners have to meet certain universal standards before they can proceed to the next level of formal education.

However, this centralised, exam-driven curriculum can be interpreted as a challenge to the integration of IK into EE, because it "ignores socially patterned experiences and the social processes that are concretely lived and negotiated" (Shizha, 2007:310). The purpose of education, therefore, "is not to prepare one to pass an exam, but to prepare one for life" (AT2:21/07/2013). This can only be achieved if learners are prepared to solve problems, issues, and concerns that they encounter in their daily life using multiple lenses.

Moreover, the participants' views, and the discourse, of LCE that have been described in this study, have, so far, shown it to be inadequate for the successful integration of IK into EE. It has proven to be inadequate because it is located within a Western approach to education that recognises the learners' cultural beliefs and ideas on moral grounds, but which treats them as an inadequate knowledge system for development (see Siegel, 2002:810). In other words, indigenous views are embraced not because of the quality and the positive contributions that they can offer to education, but because it is deemed to be morally imperative to treat other cultures justly.

4.3.4.2. *Negative practices, attitudes and beliefs in respect of indigenous knowledge*

General agreement exists that successful curriculum reforms and innovations are largely dependent on teachers. Especially, teachers' attitudes toward, and the beliefs about, reforms and innovations are important personal constructs that can decide the fate of an educational enterprise. In short, they "can make or break the innovation" (Kanu, 2005:50). In the context of this study, the attitudes toward, and the beliefs about, the value and the potential contribution of IK to education, and to sustainability in particular, determine how the integration of IK into the school curriculum will be welcomed and dealt with (Owuor, 2008:33). Therefore, teachers need to be free from cultural biases and prejudices that could influence their choice of instructional practices.

However, the teachers who participated in this study were not entirely free from such bias. The verbatim account below displays some of the biases that were detected in the interviews, and which could inhibit the integration of IK:

> In mainstream education, let me say you can even find a certain learner who's been absent from school, because he or she was taken to traditional healers, simply because he/she was bewitched, which is not true. Those are some of the gaps that we are experiencing, because even some people don't understand it, because [be]witching is not based on some scientific explanations. It's not real. It is not proved and it cannot be.

(T1:19/07/2013)

Many African people, through their personal experience and history, have come to acknowledge the existence of witchcraft as part of their IK system. However, the above-quoted teacher was adamant about, or rather ashamed to recognise that, the practice of witchcraft exists in the community in which he taught. In addition, this participant, throughout the interview, welcomed the idea of integrating IK into the curriculum. However, in the above instance he strongly rejected the existence of witchcraft, because it had not been scientifically proven. In his view, science was the benchmark for the validation of all ways of knowing, so that he totally discounted the validity of witchcraft.

Another problem encountered was that the participants viewed the inclusion of IK in the curriculum as being a mere pedagogical strategy for adding to their teaching load. The assumption was that the learners' preconceptions, which derived from their everyday life experience, influenced how they could acquire new science concepts. Their preconceptions were thought to inhibit their learning of science, because the way that they thought about concepts could serve to contradict reality, as determined in terms of the material world of science. In this sense, the rural learners' everyday experiences were not necessarily used as useful source of information for development, but, rather, as a teaching strategy to determine how students understood concepts, and, possibly, to uncover misconceptions that might otherwise hinder their learning of science. Thus, the issue was basically one of "cultural border crossing" (Aikenhead, 2001:337), in terms of which the teacher helped the learners to overcome cultural clashes between their life-worlds and the world of Western science.

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The above-mentioned views were clearly expressed by one teacher, when he was asked to explain the type of responses that he gives to learners with contradictory and divergent views to scientific ways of thinking. The teacher's response, which was marked by prejudices and scepticism regarding whether traditional knowledge was even linked to environmental problems, is given below:

> Normally, we do not say it [IK] is wrong. No, it is not wrong, because that is what they used to do. But we just have to explain that the way we do it is, like in terms of the Agricultural and Life Sciences, where we [are] used to cultivating using scientific methods. We have to tell learners that this is a traditional way of thinking, and that is the reason why the land [is] becoming degradated [i.e. degraded], and so on, and then we have to now introduce the scientific way of doing things. Not really that I am saying [that] they are wrong.

(T1:19/07/2013)

The integration of IK into education (in the current researcher's view) is far beyond the notion of culturally sensitive and cultural border crossing. Such integration entails introducing scientific concepts to, and defining them for, learners in a way that is useful and which serves to overcome the conflict that such concepts give rise to in relation to their common-sense experience and usage. The integration of IK can be better understood from Eijck and Roth's (2007:926) perspective of abandoning the concept of 'truth' that is embedded in Western science, and adopting a curriculum epistemology that:

> (a) entails both the cultural and material aspects of human, intersubjective reality; (b) concerns the usefulness of knowledge; and (c) highlights the dynamic, heterogeneous, and plural nature of products of human beings and understanding.

Thus, integrating IK into EE would mean having to produce substantive collective knowledge drawn from different forms of knowledges (that is IK and science), in a specific context, to solve problems and to make decisions about the environment. Such integration means going beyond the classroom and the laboratory setting, and collaborating with IK holders and producers, in comparing science and IK, and in identifying their usefulness within specific local contexts.

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4.3.4.3 Lack of training and programmes on indigenous knowledge

The integration of IK into EE will be a difficult task, unless a well-planned and supportive teacher training programme is in place. The educators (the teachers and the advisory teachers) in this study agreed that there was a lack of working frameworks, guidelines, methodologies, or training programmes that supported the use of IK in schools. This, in itself, indicated that the respondents had neither received pre- nor in-service training on IK. This seemed obvious, because most of the participants were Natural Sciences teachers, who had been schooled in westernised programmes that were not compatible with the holistic worldviews of IK.

If EE is to benefit from the use of IK in education, the teachers concerned need to be trained to recognise, to respect, and to understand different worldviews across cultural boundaries. Because, if teachers are not trained to be aware in this way, "they will continue to neglect it, deny it, or even denigrate it when it appears as part of student responses in classrooms" (Kreisler & Semali, 1997:10). Therefore, the infusion of IK into EE demands a well-informed and well-planned training programme that is drawn from various sources of knowledge, including indigenous people.

4.3.4.4 .Identifying indigenous knowledge holders

As was expressed by the participants, IK is generally an undocumented body of knowledge and beliefs that is usually handed down by elders and knowledgeable others through cultural transmission. However, identifying indigenous elders and knowledgeable informants who are able to provide historical and cultural information that is free from Western biases is a major constraint. For instance, the two traditional leaders in this study came from an educational and Christian background, in which they had been highly exposed to Western media. The conceptual frameworks that were found to govern their vision, in so far as observing historical, cultural and environmental events, were (to a certain extent) informed by the Western visions that they had acquired from their religious and educational encounters. Thus, the data that was collected from them could not, in any sense, be regarded as 'raw' material.

4.3.5.   What environmental education can learn from existing indigenous environmental practices

The community and the individuals in the areas studied employed a variety of innovative resource management strategies, customs and practices, which could provide the basis upon which to build up an effective EE programme in rural schools. Some of the approaches, such as mixed farming (i.e. keeping cattle, goats, and chickens alongside crop production), shifting cultivation, mixed cropping, intercropping, and transhumance were unique to the local environments and cultures.

The patterns of prevalence, or the commonness of indigenous practices among the participants, were revealed by way of the interview transcripts (see Appendix A), and were complemented by the researcher's personal experience, and by the existing literature. The commonly existing practices that were identified were related to agriculture (in the form of livestock rearing and crop farming), to the use and management of natural resources, and to environmental protection and community development. Below, a description of the IK framework, and of the adaptive resource management strategies identified, is provided.

4.3.5.1. Agriculture

As was reported in the previous sections, the majority of the people living in the study area at the time of the study were agro-pastoralists. They interacted with their environment through keeping livestock and through growing crops, which played a pivotal role in the economy of the Owambo communities, due to their provision of food (Williams, 1991:40). Moreover, the participants in this study expressed that most people in their area depended heavily on the traditional methods of farming that they had learned from their parents, despite the introduction of modern tools, such as tractors. In connection with this aspect of the background to this study, two of the participants stated the following:

> People in the rural areas are farmers. They are involved in farming activities, and the way [in which] they are doing these activities, they do them in the traditional way; being [that] it is cultivating, looking after animals, farming with animals, grazing, and all those things.

(T2:19/07/2013)

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In our community, we use traditional methods of cultivating, although nowadays we are also using tractors to plough our *mahangu* fields. But most of the methods that we use are those that we learned from our parents.

(TL1:16/07/201)

In the light of the above, it can be seen that this community possesses unique cultural skills and knowledge about the land, the crops, the plants, and the methods of cultivation that require exploring and integrating into the methods used in agricultural development for the purpose of achieving food security. Promoting cultural skills would also enhance active participation among the different stakeholders. In the following subsections, the two main agricultural practices that were followed in the community at the time of the current study will be briefly discussed.

4.3.5.1.1. Crop farming

Mahangu (pearl millet) is the main crop in the area, although people also grow beans, groundnuts, watermelons, pumpkins, sorghums, sweet potatoes, and, sometimes, maize as dietary supplements. According to Uno (2005:107), pearl millet is preferred over other cereals, because it is relatively drought-resistant, as well as being tolerant of high temperatures and capable of growing in sandy soils. The *mahangu* mealies are used to make porridge (*oshithima*), which is a staple food, and a traditional drink, *oshikundu*. The porridge is usually served with meat, chicken, or wild spinach. Figure 4.5 below shows a traditional meal that was served to the current researcher when he visited one of the participants at home for the interview.

Fig. 4.5: The meat is served in a clay pot, with the porridge being served on a woven plate made from palm leaves

Since *mahangu* is the major source of food in the area, most of the villagers have a large field of the crop, which allows them enough to feed their family and to generate an income out of which they can send their children to school. Uno (2005:108) observed that, on average, a field occupies over 4 ha, with over 90% of the fields concerned being planted with pearl millet, along with some sorghum, beans, pumpkins, and watermelons. The women are mostly responsible for sowing, planting, weeding, harvesting, and processing the field crop, whereas the men tend to clear and plough the field, and to look after the livestock.

The female traditional leader (TL2) explained that, in recent years, the government had attempted to improve the *mahangu* production in the area by introducing an improved cultivar, called Okashana. This cultivar is believed to have a high yield potential, a short maturity range, and thin, short stalks. Though such innovations are necessary, more especially due to the area having experienced little rainfall in recent years, TL2 expressed some dissatisfaction with the quality of the cultivar. She stated that, in spite of some of the good qualities of the improved cultivar, the farmers preferred to farm with the local cultivars, because they had strong stalks that did not dislodge easily during heavy wind or rain, and which was suitable for use as building material. She acknowledged that the improved cultivar was best suited to the low rainfall season, but she quickly added that it was unsuitable for the season of prolonged rain and floods. Yet, "when it was introduced, people were not well informed [of its weaknesses]. Now, if you look at our community, most people hardly uses [i.e. use] it. I also do not use it that much, more especially these days when there is flood," TL2 claimed. Figure 4.6 ((a) and (b)) below shows a field of *mahangu*.

Fig. 4.6: (a) A field of young *mahangu* (pearl millet); (b) a field of dried *mahangu*

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4.3.5.1.2. Livestock farming

Livestock constituted another extremely important component of the Owambo people's existence, with almost every family owning some. Strangely, with the exception of one traditional leader, no participant referred to how the livestock are reared in their environment. However, the three male teachers and the one female teacher indicated that they used to look after the livestock when they were young. The herding of livestock is culturally and widely considered to be socially appropriate for boys, but, when there are no boys in a family, the girls are expected to take on the chore.

The types of livestock that are kept by people in the area include cattle, donkeys, goats, and sheep. Other domesticated animals, such as chickens and pigs, are also reared. Cattle are the "most significant" resource in Owambo, because they form part of the local economic and religious life (Williams, 1991:42; Marsh & Seely, 1992:26). The reared cattle are predominately Nguni, which are well adapted to the local harsh and variable conditions under which they have been bred for many years (Marsh & Seely, 1992:26). Williams (1991:42) explains that the reasons for rearing cattle in Owamboto are for use in breeding, sacrifices, inheritance, bride-wealth, refunds or the paying of ransom, and for barter.

Keeping both crops and livestock is a major strategy that is employed to cope with the low levels of fertility and the highly unpredictable conditions, as is practised elsewhere in sub-Saharan Africa (Verlinden & Dayot, 2005:143). In response to the challenging environment, the farmers in this area have developed a traditional agricultural calendar, which regulates the agricultural and livestock activities (Williams, 1991:40), and which has also led to increased productivity. Figure 4.7 below illustrates some activities that are scheduled according to the agricultural calendar followed in the Owambo community.

Agricultural calendar
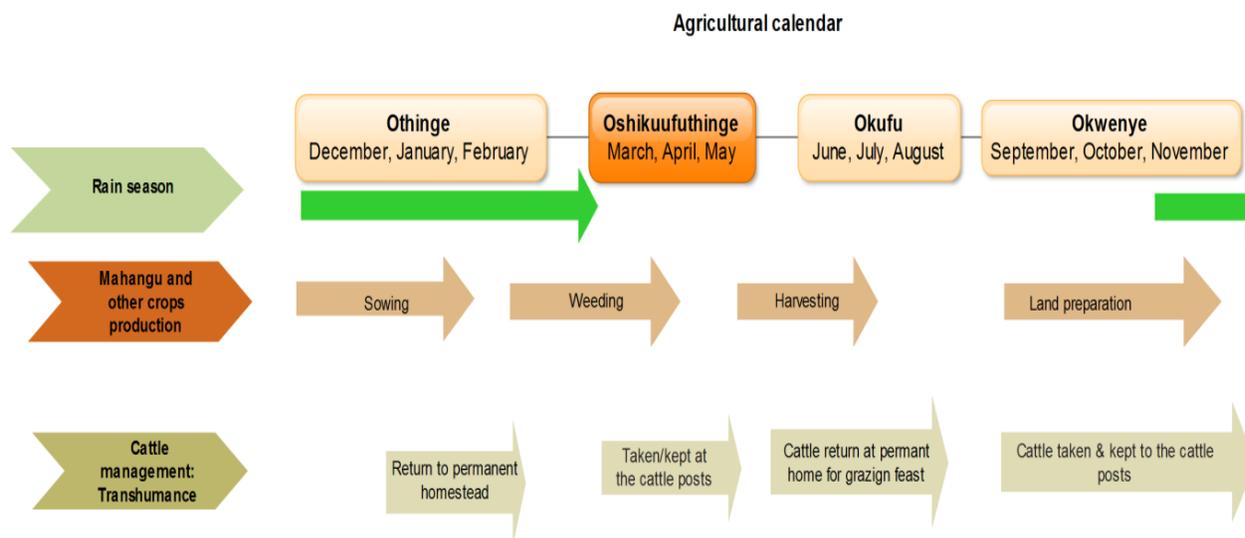
Fig. 4.7: Some activities scheduled according to the agricultural calendar followed in the Owambo community

Sources: Adapted from Williams (1991); Marsh & Seely (1992)

According to Williams (1991:40), livestock-raising activities mostly depend on the performance of agricultural activities, and on the receipt of an average amount of rainfall. One of the important agricultural activities is the grazing feast called '*omalwenge*'. Once the harvesting is done, the chief directs the farmers to graze their livestock on the remaining stalks.

> For '*omalwenge*', you need to be given permission, because this is authorised by the traditional authority. You just don't put your livestock in the field, because there might be others with their pearl millet yet to be harvested.

(TL1:16/07/2013)

Once the pearl millet stalks are finished, the cattle are then taken back to the cattle post, where the availability of grass and water is guaranteed during the dry season. Williams (1991:42) noted that this practice is adopted to ensure the well-being of the cattle, and to make sure that milk and butter production is sustained throughout the year. Most importantly, the practice prevents the overgrazing of the already densely populated areas, where the families live permanently. At the

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time of the study, livestock mobility in the area was highly restricted, due to wealthy farmers having fenced off large areas of grazing land. This physical obstacle has forced the poor communal farmers to have to graze their livestock throughout the year near their permanent house, which is mostly populated by both human and livestock.

4.3.5.2. The use and management of natural resources and environmental protection

This study has revealed that the local communities in the study area had a rich store of local base knowledge pertaining to the uses, the guidelines, the processes, and the management protocols pertaining to the available natural resources and to environmental protection. Three subthemes emerged from the interviews: local knowledge pertaining to (1) wild plants and thatching grass management; (2) water management; and (3) indigenous plants. It is important to note that most of the contributions that were made to this section came from the interviews that were held with the traditional leaders.

4.3.5.2. 1. The uses and management of wild plants

For many years, wild plants have played essential roles in meeting the many basic needs of the rural communities in the developing world. As a result, most of the rural inhabitants of Namibia and Owambo, in particular, are endowed with a deep knowledge concerning the use and the management of wild plants. According to Williams (1991:42), wild plant resources are used in various ways, such as to provide low-cost construction material, food supplements, fuelwood, household utensils, and traditional medicine for those living in the rural areas. In addition, wild plants may serve as sources of employment and income generation to meet their minimal subsistence needs, through the processing and the selling of plant products. In the current study, traditional medicine, wild fruit, thatching grass, and water management were identified as the most prevalent practices to emerge from the data.

Traditional medicines remain part of human and animal primary health care. The medical plants that were identified by the participants included ekato (carrion flowers, or *Stapelia kwebensis*), ekakata (*Harpagophytum procumbens*, or the commonly called devil's claw), mopane leaves, and edombo (*Aloe zebrine*, or tiger aloe). These medical plants, which are based locally, are used for treating a range of diseases in both humans and animals. For instance, according to TL1 plants, carrion flower, for instance, is used to prevent rabies in both humans and animals. Zebra aloe is used as an eye medication for chickens, while mopane leaves help to prevent, or to reduce,

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nausea and vomiting in humans. Therefore, medicinal plants and their uses are not only helpful in conserving cultural traditions and biodiversity, but also in the maintenance of community health care and drug development, both in the present and in the future (Cheikhyoussef, Shapi, Matengu & Ashekele, 2011:1,2).

Wild plants also serve as sources of food to supplement agricultural produce, and as a means of survival during times of drought and famine. As a result, most families keep wild fruit trees, such as palm trees, bird plums (*Berchemia zeyheri or Bechermia discolor))*, and marula trees for marula wine, with edible oil being extracted from its nuts, among other products. The extract below expresses how and why wild plants and plant resources were being conserved in the community at the time of the current study:

> Our people took care of these plants, because it was the only source of food that they could depend on during [the] drought season [*coughing*]. Palm fruits were not wasted, and the palm trees were well looked after properly. The palm fruits are not harvested until ripen[ed]. If the fruits are in excess, it is stored in baskets. During [times of] drought, when there is no[t] enough food, [the] people would than use the stored palm fruit and eat it with [*mahangu*] porridge . Even when [the] people started going to school, there wasn't modern food, and [the] children were given '*oshinkendendenga*', made from squeezed bird plums.

(TL1:16/07/2013)

In addition, many traditional indigenous plant foods have dietary importance that is comparable to those that are available in an average market today. Without them, many of the indigenous people would have suffered from such dietary deficiency diseases as kwashiorkor and pellagra, as Marsh and Seely (1991:31) claimed. Yet, there was a reported decline in interest in the use of wild edible fruits in the community, which would eventually lead to an end to the wild edible fruit tree bearing. Two decades ago, Marsh and Williams (1991:30) argued that this change in people's attitudes towards wild fruits required immediate attention in terms of agricultural and primary health care planning. However, the fact that the teachers made no reference to how instruction in the use of wild or traditional foods was integrated into such Life Sciences topics as Health Education and Nutrition of the Human Body raised another major concern.

4.3.5.2.2. Water resources and thatching grass management

Evidence from the interviews that were held with the traditional leaders revealed that indigenous resource management systems not only tended to increase food production, but also to provide a wealth of expertise and practices that could contribute even more to protecting of the environment. The two traditional leaders interviewed gave detailed insights into indigenous and local management systems and into the highly complex customary law systems that protect and shape the use of forestry, water resources, and thatching grass.

A senior traditional leader stated that the conservation of water and of water resources was not something new, or which was associated with the use of tap water. In the past, water pans and lakes were assigned to specific people to take care of, until the level of the water subsided. Once the level of the water subsided, the local people would be allowed to start fishing.

The traditional leader stated:

> Ever since, water has been conserved, and that is why even our oldest water pans and lakes that keep water for a long time, such as Amungali and others, are assigned to someone [a man] to look after it until the water subsides, and people are than allowed to start fishing. This type of conservation has always been there.

(TL1:16/07/2013)

This type of management had prevented the use of traditional fishing gear and nets in clean, drinkable water that was fit for both human and animal consumption. Another significant factor locally was that, when the floodwaters were flowing, intensive fishing in the upper parts of the *oshanas* might have prevented the fish from reaching the fishermen further downstream (Byers, 1997:23). The female traditional leader addressed this concern by stating that the catching of fish, or the use of fishing nets, was not permitted until the floodwaters reached the low-lying areas. This was to ensure that even those who resided at the very end of the floodstreams, and the interlinked water courses and pans, benefited from the seasonal, and largely limited, food resource. She explained:

> We make sure that people do not start catching fish before it reaches other place. Other people also need at least see them (fish) moving in their *oshanas*. Especially, no one is allowed to start

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catching fish with a net before the floodwater reaches Ombuga [the desert], where most rivers end.

<div align="right">(TL2:23/07/2013)</div>

Also under the customary law, the traditional authority provided for the protection of water and its resources, and the local headmen had jurisdiction over the fishing rights involved (the nature of what is customary will be addressed later on in this chapter). However, the major concern is that this traditional type of management has seemed not to be accorded the amount of respect that it deserves in education and in the rest of the public arena, and that it will eventually, therefore, perish.

Grass was another important natural resource in this area, not only because it was the main source of food for the animals, but because it was also used as a building material, especially in the thatching of huts. The most common thatch grasses in the study area were *Aristida gracilior*, *Aristida stipitata* and *Penicum trichonode.* The two traditional leaders clearly indicated that, under the traditional law, the harvesting of thatch grass before it had become mature was illegal, because doing so reduced the future production of grass. Such a practice, in terms of a biological explanation, is due to the early removal of grass preventing pollen formation. If there is no pollen to shed, no seeds will form. It is, therefore, vital that the grass not be removed before the pollen and seeds develop, and are dispersed by the wind. One traditional leader stated:

> The thatching grass cannot be harvest[ed] while it is immature. It needs to be protected, so that people can only start cutting it down once it is dry, and it would [then] leave seeds that will grow into grass again in the future.

<div align="right">(TL2:23/07/2013)</div>

Another important reason for people not being allowed to harvest grass before it was fully dried was because the immature grass has a shorter life span compared to a mature one. TL1 stated that, when the grass was harvested when it was fully dried, it could last up to 7 to 8 years without falling off the thatched hut. However, if it was harvested while still fresh, the hollow stem would shrink, and the grass would become so light that it could easily be blown off the hut by the wind, within a very short space of time.

<div align="center">109</div>

To prevent the harvesting of immature grass, and the maintaining of future production grass, the harvesting season was officially opened by the traditional authority concerned. Once the season had been opened, the local people were granted permission to harvest, until the start of the next rainy season. During the harvesting process, the seeds fell off the dry grass, into the dried-up swamps, and, when the rainy season came, the seeds would start germinating again. This practice was significant, as it helped to guide and to regulate the indigenous and the local communities in the use and management of thatching grass, hence bringing about other environmental and social benefits.

4.3.5.3. Customary law as a source of community development

Community development, in the context of the current study, refers to any interventions that are aimed at strengthening the existing processes, structures and institutions by means of which indigenous people are organised, share responsibilities, exercise power, and make decisions so as to find solutions to environmental problems. The assumption is that, if indigenous people are given the necessary information, the appropriate capacity, and financial support, they are capable of identifying the community priorities, and of defining and finding development solutions to local problems. However, in most cases, the developmental efforts concerned drew heavily on Western models of thinking and the indigenous people were forced to adapt to a non-indigenous community development model (Burchill, Higgins, Ramsamy & Taylor, 2006:50–59).

In the current study, it emerged that efforts were being made to integrate Western and indigenous cultural practices in development. Specifically, the comments made by the traditional leaders indicated that the government and other institutions had made reasonable commitments to supporting local customary law. Perhaps this is because most of the Namibian population live according to customary law for various reasons, so that they are familiar with the peculiarities of traditional knowledge, and tend to have the capacity to accommodate what is special to traditional knowledge (Ruppel, 2010:323). Importantly, the Constitution (Article 66) also makes provision for the recognition of customary laws that are in line with the present situation in post-independence Namibia.

The current study has also revealed that indigenous elders in the community are willing to share their knowledge, and to learn from others, through entering into dialogue and partnerships. The traditional leaders, who also served as presiding officers in the community court, indicated that

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they had received university-level training in basic law under the leadership of Professor Manfred Hinz, from the University of Namibia. According to TL1, the Uukwambi Traditional Authority (UTA) was, at the time of the study, in consultation with Professor Manfred Hinz to publish a book on indigenous-related matters that would be made available to schools. This partnership effort has already resulted in the publication of a monograph on challenges to customary and environmental law, biodiversity, and the ancestors in Namibia (Hinz & Ruppel, 2008). The publication provides a unique insight into the practices and the customs of those living in a traditional setting, including the areas in Uukwambi. It communicates useful information to different audiences that are interested in environmental concerns, biodiversity, and customary law.

Another plausible effort, in the case of the UTA, is the fact that traditional laws are documented in what the TL1 referred to the *regulations booklet*. During the interview process, the TL1 made references to several sections and laws in the booklet that are aimed at addressing and protecting the environment. Written in a local language, the booklet "gives instructions and procedures that need to be taken in all aspects", including environment management, according to the TL1. As observed by Ruppel (2010:110) elsewhere, it clearly indicates the protection of water (section 13), trees (section 14A), wild animals (section 14B), and grass (section 14C). Section number 15 in the booklet clearly expresses why environmental management is a serious concern for the traditional leaders. It reads as follows:

> Due to increased population, limited space and lack of knowledge, our forests and jungles have been reduced in the northern part of Namibia. The beauty of Northern region landscape is observed in trees and shrubs, however this elegance is now depleting in our area. The lack of knowledge on the importance of trees and plant has also led to reduced rainfall in our area.

(TL1:16/07/2013)

Nevertheless, the customary laws are complex, and a description of them is beyond the scope of this research study. This means that there is a body of unwritten law that remains in force, and which cannot be easily understood without having a full grasp of the local complexities, and of the history of those involved. Only the local indigenous community members themselves have the capacity to fully comprehend and to use such laws within the wider context of the environment, for the sustainable development of natural resources, and for the protection of

biological diversity (Ruppel, 2010:323). Thus, there is still a need to engage properly with the community, to conduct skills and knowledge audits of community members and stakeholders, to believe in the local people, and to accord them the authentic and the proper respect that they deserve (Burchill *et al.*, 2006:50–59).

4.4.   Conclusion

This chapter provides a historical, social and cultural context of the schools in which the participants concerned interact with the environment. The schools are located in rural areas, where the livelihood of learners largely depends on the natural environment for survival. A thematic analysis of traditional leaders, advisory teachers and teachers' responses revealed that there is a general agreement that IK result from common understanding, and the long-standing experience of, the local environment in various areas. However, teachers and advisory teachers depict limited understanding of what the concept EE entails. They limit EE to bio-physical issues. Despite this conceptual weakness, the participants embraced the idea to integrate IK into EE on both principled and pragmatic grounds.

The data further revealed that, there exist enormous challenges that need to be addressed first before IK can be appropriately recognized and integrated in EE. These challenges are related to inappropriate curriculum design, teacher negative practices, attitude and beliefs toward IK, lack of working programs on IK and lack of IK holders who are free from western bias. The challenges are not insurmountable. They can be dispelled if all stakeholders concerned play their parts to facilitate the integration process.

Finally, the findings also indicate that indigenous resource management strategies, customs and practices exist among the community and individuals in the areas studied. The most prevalent practices are related to agriculture and use and management of natural resources. The agricultural practices are related to livestock rearing and crops. The use and management of natural resources such as medicinal plants, water and water resources and thatching grass as a source of community customary law have also been identified. The researcher concluded that indigenous agricultural practices, resource management strategies and customs could provide the basis upon which to build an effective EE in rural schools.

Chapter 5

Conclusion and recommendations

5.1 Introduction

In the final chapter, the researcher ought to step back and take a broad look at the research process as a whole. The main findings with respect to the research questions are summarised and discussed in this chapter. General conclusions based on the findings are presented and compared with the literature and the research methodology that have been explained in the previous chapters. The main question that the researcher investigated in this study was: How can IK be used to support EE in selected Namibian rural schools? Subsidiary questions guiding the exploration of this major question were: What are the views of teachers, of the subject advisors, and of the traditional leaders about how IK can be used to support EE? What are the opportunities and the challenges involved in attempting to achieve the integration of IK and EE? How can IK be mobilised to enhance environmental learning within the school curriculum? The findings suggest that IK can add value to EE in many different ways, but that existing centralised curricula policies and teaching approaches are not always suited to the local context. Based on this finding, recommendations are proposed to guide educational stakeholders to the successful use and integration of IK into EE. It is suggested that the current EE curriculum be restructured beyond the traditional disciplines boundary. A cross-cultural Science Technology and Society (STS) curriculum framework has been proposed as an alternative education model that has the potential to integrate IK into EE. Finally, limitations of this thesis are considered and suggestions for further research are presented.

5.1.1   Main findings

These findings are drawn from a review of National (Namibian) Curriculum for Basic Education and Life Sciences curriculum documents and from the interviews that were conducted with traditional leaders, advisory teachers and teachers. The main argument raised in Chapter 1 is that EE implemented in Namibian rural schools perpetuates an image that Western science is the only way to learn and understand the natural world, "thereby denigrating the learners' IK as inferior and non-scientific" (Jegede, 1997:1). Learners are made to pass through the science course

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without really understanding the content because it is removed from their everyday experiences and worldviews. An analysis of the National Curriculum for Basic Education and Life Sciences curriculum documents further justifies that the curriculum is firmly grounded on Western education. The national educational programmes seem to be geared more closely to an urban context where the locus of control of curriculum development processes for schools is usually found (Taylor & Mulhall, 2001:132). IK and its related concepts rarely find expression in the two documents. Although teachers accept that learners come to class with a body of knowledge that is derived from their immediate environment, this knowledge is usually not accepted as true knowledge in classrooms.

The findings of the interviews also supported the key argument raised in the problem statement and the literature review sections. Teachers and advisory teachers especially had general difficulty in understanding what the term 'indigenous knowledge' means. Their explanations or conceptions of IK were limited to locally based ways of knowing, seeing and thinking, which are passed down from one generation to the other. According to Dziva, Mpofu and Kusure, (2011:89), such conception is incomplete, because it primarily focuses on the metaphysical dimension of IK, thereby neglecting the methodology, the process involved in knowledge production. IK, as is the case with scientific knowledge, is generated through trial-and-error, deliberate experiments to develop and test new techniques and knowledge, to adapt and respond to a changing economic and biophysical environment (Mundy, 2007:1). Even though IK is an unfamiliar concept among many educators, IK practices do exist in local communities in which they taught or lived. Likewise, the study also reveals that many educators lack a holistic understanding and a widely accepted conception of EE. This is so because studies of society, the economy, politics and the biophysical environment are usually taught within separate subject disciplines in schools with little or no regard for their linkage (Unesco, 2002:16). However, the conceptual barriers regarding the definitions of EE and IK can be blamed on the national curriculum documents that have paid lip service to such concepts.

Nevertheless, participants in this study support the idea of integrating IK into EE on principle and pragmatic grounds. However, most participants (especially the traditional leaders) were more concerned with the former, citing that exposing learners to indigenous perspectives would help them to maintain their cultural identity, develop respect and understanding of their culture.

Only two of the six educators (teachers and advisory teachers) were explicit about how IK can contribute to formal environmental learning in schools. The remaining four were less or unable to provide specific examples of IK or culturally relevant science teaching that could enhance environmental learning. This can be because most educators in the country have been schooled in the Western worldview of science. Nevertheless, their voices suggest that IK is an underestimated and underutilised resource in education. Especially in this specific study context, the knowledge and skills that are taught in school do not represent the depth and diversity of local knowledge.

Furthermore, the participants' reactions to a proposal to integrate IK into the science curriculum revealed several challenges. The most significant challenges are related to the national curriculum design, high-stake examination results, traditional discipline content boundaries and the way LCE is conceptualised and practised. The participants complained that there is too much content to be covered, and exam pressure forces teachers to concentrate on helping learners to achieve prescribed basic competencies. Issues relating to curriculum design, centralised examination, and pedagogy and learning methods are discussed in detail in the next section. Educators' attitude toward IK is another concern that emerged from the data. Although the participants generally embrace the integration of IK into EE, some were sceptical about spiritual beliefs. In addition, evidence from the data also revealed that there is lack of training and programmes that support teachers to integrate IK. The participants indicated that the only existing IK-related programme is the newly introduced Traditional Life Skills Programme, which is currently offered at one school in the entire region.

5.1.2. *Indigenous knowledge practice used in the study area*

The interviews, especially with the two traditional leaders, revealed that indigenous practices exist that could contribute to the achievement of our dream of sustainable development. The local indigenous people have been described as agro-pastoralists who depend heavily on various traditional substance agricultural activities. Indigenous practices such as the choice of drought-resistant crop and the use of a traditional agricultural calendar are still relevant to farmers, and could play an important role in managing livestock, fodder availability and crop farming, as well as the economic wellbeing of the local communities. The livelihood of people in this study area depends heavily on agriculture activities, as is the case in most developing countries. Children

are the ones who usually help with weeding, cultivating, harvesting and looking after livestock. Therefore, most of them have direct, first-hand experience of agriculture, either as a result of their own activities in contributing to the family livelihood, or from observation of their immediate surroundings (Taylor & Mulhall, 2001:132).

However, most indigenous agricultural practices have been ignored, with the teachers being unaware of most of them, and of how they could benefit environmental learning. In addition, these practices are neither formally nor publicly taught in schools, which make it difficult for the learners, who are most likely the future farmers of the nation, to appreciate them. In a similar study, Taylor and Mulhall (2001:132) explored three interrelated learning environments of rural primary school learners in developing countries: the school, the home and the wider community (see also Vandenbosch, 2007:2). They argued that these three interrelated learning environments are often weakly linked and the experiences gained in each are seldom drawn together and integrated in the learning process. This 'distant' relationship between learning environments is illustrated in Figure 5.1 below:
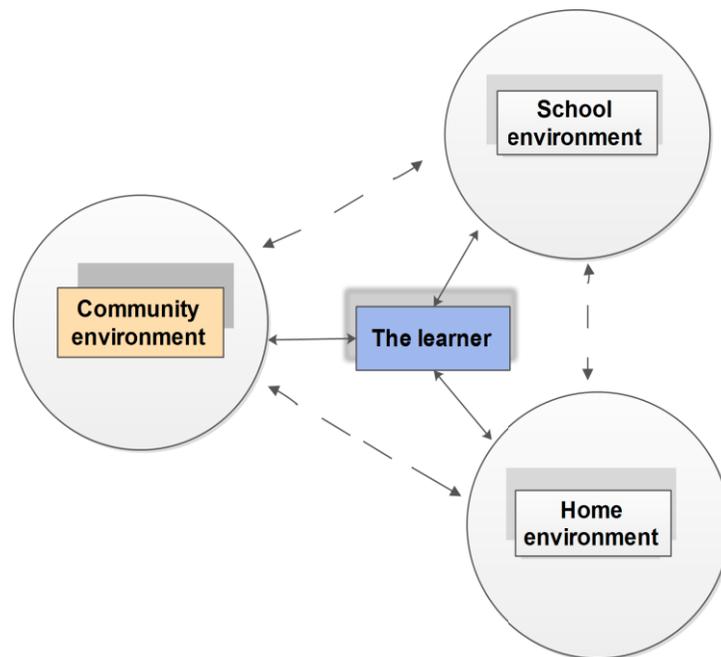
Fig. 5.1: Linkages between school, home and community environments

Source: Adapted from Taylor & Mulhall (2001:138)

According to Taylor and Mulhall (2001:132), the existence of weak linkages (the dotted arrows) between the three learning environments indicates that the experiences gained by learners in school are often perceived to be divorced from life outside of school, not only by learners but also by parents and teachers. Likewise, the findings in this study have shown that there is a large gap between school and learners' everyday life experience derived from the home and community. The schools seem to operate as islands, with different sets of norms, values, culture and knowledge detached from the communities that they serve. Parents' inputs are usually only considered when it comes to administration-related issues such as school fees and absenteeism, while they are less or not involved in day-to-day classroom practices.

Taylor and Mulhall (2001:132) state that learning can become more effective by strengthening the linkages and maximising the interfaces between learning environments, as shown in Figure 5.2.
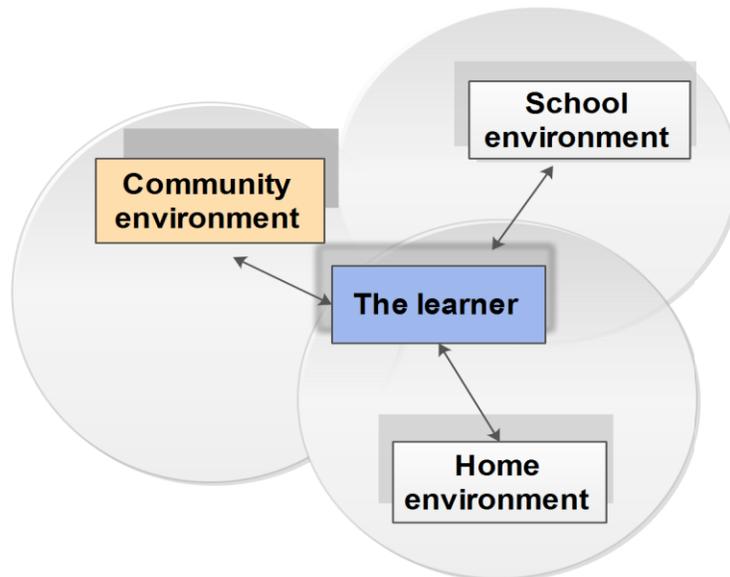
Fig. 5.2: Linking the learning environments

Source: Adapted from Taylor & Mulhall (2001:132)

However, strengthening the linkages and maximising the interfaces between learning environments pose daunting challenges. Even worse, indigenous people are forced to abandon their traditional agricultural methods. For instance, recently, as reported in some local printed media, Mary Seely, a founder of the Desert Research Foundation of Namibia (DRFN) and a

leading scholar on EE, blamed the recent drought in northern Namibia on local farmers who seem resistant to change their agricultural practices. She claims that the farming land is overstocked beyond capacity and that farmers are reluctant to practise crop rotation despite several workshops presented to them (Kahiurika 2013).

While drought is a serious concern in the region, it is seems naïve to blame its occurrence entirely on local farmers. This is not an attempt to romanticise IK, as there are reported cases in the literature where IK has contributed to environmental problems. However, it is important to note that the traditional agricultural methods in this area, such as the seasonal movement of cattle from one grazing ground to another and from lowlands to highlands to prevent overgrazing and overstocking, are highly restricted and disrupted. National policies and legislation such as the Communal Land Reform Act 5 of 2002, which allows privileged farmers to buy and erect fences on large traditional grazing land, has forced poor farmers to graze their livestock throughout the year in already densely populated areas where they live permanently, thereby resulting in overgrazing.

5.1.3   *Curriculum issues arising from the case studies*

Although this study has shown that there is potential for IK to add value to existing EE in rural areas, its introduction may be constrained by multiple challenges. The most significant challenges that emerged from the findings are related to (a) a centralised curriculum model, (b) high-stakes centralised examination, (c) the nature of academic subjects, and (d) the version of LCE used in schools based on worldviews that do not adequately recognise and appreciate indigenous perspectives. To unpack this conclusion further, the centralised curricula, examination, subject content and teaching methodology are briefly discussed and a reflection on their implications with respect to IK and EE is given.

5.1.3.1 Centralised curriculum constraints

The advisory teachers (Section *4.3.4.1.*) indicated that teachers' classroom practices are informed by the curriculum. Curriculum is defined in this study mainly as *content*, such as that reflected in textbooks, syllabi, policy documents and teacher resources (Jansen, 1989:219). The structures of the Namibian school curriculum, as in many other developing countries, can be described as centralised/nationalised and prescriptive. This means that criteria for and decisions about

curriculum goals, objectives, instruction and contents are decided on by a central team of curriculum experts. In general, such a curriculum approach is derived from a hierarchical, scientific structure of inquiry influenced by behavioural psychology (Lambe, 2003:308). Bloom's taxonomy and classification of educational objectives into measurable outcomes in particular have had a huge influence on the curriculum in Namibia (Kristensen, 1999:3). Therefore, emphasis is mostly placed on content knowledge and procedures (process and skills), and in a few cases attitudes, values and democratic principles have been included.

A more subtle issue is that the curriculum emphasises the compartmentalisation of knowledge (Barnhardt & Kawagley, 2005:8) based on rigid subject areas and regulated by subject policy documents. The curriculum content to be covered, time allocation and the assessment methods for each subject are described in the syllabus. Furthermore, teaching and learning materials (such as textbooks) are prescribed in a 'textbook catalogue', which is an official document (Mahmood, Iqbal & Saeed, 2009:1). The National Institute for Educational Development (NIED) under the MoE provides the guidelines or standards that are used in textbook evaluation. In most rural schools, such as the one discussed in Section 4.2, the use of libraries and other media centres is relatively restricted. Hence, learners and teachers rely heavily on prescribed teaching and learning materials to achieve the desired outcomes.

The centralised curriculum system may have been adopted because of its economic and political benefits, especially in countries with a diverse society such as Namibia. A centralised curriculum has the advantage of reducing costs, promoting uniformity of state-'approved' practices, unifying a nation with large and diverse ethnic groups and easing teacher training technical expectations (Clune, 1993:233). This also gives government control over education, as it served a more regulatory function in developing and distributing essential educational resources and services, through providing centralised 'output control' mechanisms to monitor schools and teachers. Crossley, (1994:37) neatly justifies the extended use of a centralised curriculum system in developing countries as follows:

> A centralized system is also economically more efficient with all schools working towards the same curriculum and syllabus, there is an economy of scale in the provision of infrastructure, equipment, books and expenditure on materials, since 'standard' items can be bought and/or

ordered in bulk based on the assumption that all schools' needs will be the same and large economically viable runs of material have a guaranteed market.

However, irrespective of the strengths or merits of the above arguments, curricular homogeneity poses an enormous problem in achieving social and political consensus (Clune, 1993:233). It neglects the basic principle of EE that curriculum planning should be contextualised so that it is related to learners' values, culture, life conditions and future expectations, as well as to community economic activities (Ruiz-Mallen, Barraza, Bodenhorn, Ceja-Adame & Reyes-García, 2010:1755). The school calendar is often designed to fit more with an urban industrialised system, which expects of children to attend school during busy periods in the agricultural calendar (Taylor & Mulhall, 2001:135), when they are most needed to help at home with households activities. As a centralised curriculum is often designed for a context and culture removed from that in rural areas, parents are less able to provide support for their children (Mulkeen, 2005:33). The implication here is that school knowledge and local knowledge are seen as fairly isolated knowledge systems that do not seem to mutually nurture each other.

Jansen (1995:245) describes a centralised curriculum as 'notorious', because it lacks due consideration of the 'practical realities' of teachers' work. It is often very demanding and leaves little opportunities for localised interpretation of the content (Vandenbosch, 2007:1). In particular, IK is a difficult phenomenon to integrate within a highly structured and centralised curriculum, because it is only applicable in particular contexts in which it is produced and generally used, while on the other hand, knowledge from scientific praxis is assumed to transcend such local contexts (Eijck & Roth, 2007:926). Le Grange (2010:13), while assessing the inclusion of environmental concerns regarding the South African science curriculum, argues that outcomes-based education (OBE) and EE are incompatible. This is so because the mechanistic, reductionist and instrumentalist epistemology nature of OBE is by far contrary to the holistic understanding of environmental knowledge, a principle that is widely accepted in EE circles.

5.1.3.2 High-stakes examination
More importantly, however, the data exposed that examination is regarded as the main driving force behind the school curricula, possibly because schools and teachers are held accountable for poor performance. This pertains specifically to the grades 10 and 12 results that are published in

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local printed media, and hence comparison is made between regions, schools, teachers and learners. Therefore, the results serve as a major indicator for parents, policymakers, inspectors and all interested communities that continue to view education as only meant to advance learners through a reward system of examination (Singh, 1986:25). In addition, good examination results help learners gain entry into tertiary institutions or employment, while poor results force them to abandoned their ambitions.

Therefore, under the pressure of this highly rated and competitive academic examination results, teachers are not flexible enough to accommodate local views and real-world field-based learning that are not part of examination. In the process, the development of locally relevant knowledge, skills, attitudes and independent thinking, which are prerequisites for EE, are discouraged. Namibian scholars Kasanda et al. (2005:1805) have also raised concerns regarding examinations and assessment tasks in standard textbooks, which need to create a link between learners' everyday experiences and science content. In addition, examinations send contradictory signals to teachers who have ignored the challenge to change their classroom practices (Jansen, 1989:219). Based on personal experience as a learner and teacher in two rural schools, examination pressures force teachers to concentrate on 'teaching for examination', as stated by one participant. It is rather unfortunate that the widespread use of the teaching approach geared towards teaching for examination has discouraged innovation in matters dealing with teaching in rural schools (Singh, 1986:25).

Moreover, narrow examination-focused teaching often clashes with the aspirations of the learners themselves, who are trapped in an examination system (Flogaitis & Alexopoulou, 1991:339), which seldom attempts to measure the comprehension or application of ideas that are learned. According to Barnhardt and Kawagley (2005:8), most examinations only measure predetermined ideas of what the person should know. However, that does not necessary mean a person is capable of putting the required knowledge into practice. Therefore, learners study merely to pass examinations because they do not see the relevance of such knowledge to activities outside the classroom. Of course, this approach would be more readily adopted if examinations were to use local contexts.

Another major concern regarding this uniform and centralised examination system is that it tends to promote cultural values and identities that are alien to indigenoua culture. Jansen (1995:245)

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refers to it as "cultural imperialism". In view of the current findings, Jansen's (1989:219) argument that African countries with localised examination systems, such as Namibia, continue to be influenced by foreign systems supports the present assertion. The recent replacement of the "heavily biased" (Jansen, 1995:245) British Cambridge Examination System with the National Certificate of Secondary Education in Namibia is to a large extent an issue of name changing, while the practices and policy assumptions are still the same. Standardised examinations are still in use despite the fact that classroom realities and resources remain highly unequal throughout the system.

5.1.3.3 The problem with Life Sciences subject content

Another challenge in incorporating IK into EE is the nature of academic subjects that are taught in schools. The curriculum in Namibia is organised by discipline and keyed to the content of specific course sequences. The subject concerned here (Life Sciences) falls within the traditional natural sciences discipline. The primary goal in the natural sciences curriculum in Namibia is to promote the acquisition of scientific knowledge and skills. This goal is regarded as a prerequisite for a progressive national economy and improvement of the standard of life for the people. In addition, learners and society are prepared to use modern and advanced technology such as equipment, materials and processes effectively to manage natural resources, solve problems and satisfy their needs.

The study reveals that there is a widespread problem with the way that the environment and sustainable development are presented in the natural sciences discipline. Firstly, few attempts are made to establish balanced learning experiences that draw from different knowledge perspectives, including IK. Consequently, the knowledge and skills that are taught in Life Sciences do not really represent the depth and diversity of the local environment, especially as science is taught in a decontextualised and detached classroom setting (Barnhardt & Kawagley, 2005:8). This explains why advisory teachers were adamant that teachers continue to feed learners with scientific facts, concepts and process skills that are deemed important. However, a widely supported position of EE goes beyond the obvious acquisition of scientific information to include active deliberation about issues relating to one's environment (Meichtry, 2001:17).

Secondly, participants raised a serious concern that Life Sciences has lost its initial focus of environmental learning because the content had been restructured in the direction of Biology content. The assumption is that Biology and other subjects in the natural sciences discipline place emphasis on biophysical phenomena and processes of the environment, and that relatively limited or no effort is made to link it to the economic, political and social systems. This also explains why some educators (teachers and advisory teachers) in this study are short of a holistic understanding of EE. Their descriptions of EE were restricted to biophysical dimensions, while other key underlying dimensions were far less well understood or were completely absent. This is no particular surprise, given that certain contents (political, economic and social contents) are identified with different disciplines or subjects areas, such as social sciences.

The question, however, is whether traditional science subjects, including Life Sciences, can provide the learning experiences that are compatible with contemporary EE policy and other guidelines on sustainable development, such as Agenda 21. This is a critical question, given that the relationship between science education, IK and EE is a contested terrain (Gough, 2002:1201; Hadzigeorgiou & Skoumios, 2013:405; Hart, 2002:1239; Le Grange, 2010:13). However, in view of the current findings and available literature, the answer to the above question is an emphatic "no", as the findings in this study strongly support the views of many environmental educators who have long argued that "modernist notions of schooling and curriculum, which are organized as subject matter disciplines, are inappropriate for learning about complicated, interdisciplinary social and environmental issues" (Hart, 2002:1239).

The Life Sciences curriculum has so far proven to be an inadequate vehicle for EE. The teaching of the four environmental dimensions or systems as independent entities is particularly antithetical to the principles and goals of ESD and EE, as amplified in the *From Rio to Johannesburg* report on the UN Conference on Environment and Development (the 'Earth Summit). In this report it is stated that "[l]inking social, economic, political and environmental concerns is a crucial aspect of sustainable development" (Unesco, 2002:8), which need not be negotiated in schools.

At the same time, the integration of IK into Life Sciences would require IK to be structured along the lines of conventional science subject disciplines. Such approach has however proven to be exceedingly difficult for many science educators around the world (Chahine, Kinuthia &

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Maxwell, 2013; Kanu, 2005:50; Shizha, 2007). This is so because it entails identifying teaching materials such as textbooks, films and texts that would have incorporated IK into identified science core areas (Emeagwali, 2003; Hart, 2002:1239) and that has (perhaps) been accepted as true knowledge. However, discovering such outstanding texts is a challenging task, given that "indigenous people have their own ways of looking and relating to the world, the universe, and each other" (Barnhardt & Kawagley, 2005:8). This formidable practical obstacle is exacerbated by the fact that IK is rarely written down and sometimes spiritually oriented.

5.1.3.4 Learner-centred education

LCE as has been observed in this study is a popular, pedagogical policy in Namibia. Schweisfurth (2013:20) defines LCE as a "pedagogical approach which gives learners, and demands from them, a relatively high level of active control over the content and the process of learning. What is learnt, and how, are therefore shaped by learners' needs, capacities and interests." The curriculum policy documents describe LCE in a similar way as a pedagogical tool that (a) promotes the use of learners' existing knowledge, skills, interests and understandings from previous experiences, (b) offers challenging and meaningful tasks to nourish learners' natural curiosity and eagerness, (c) empowers learners to think independently and take responsibility of their own learning and (d) involves learners as partners in rather than receivers of educational growth (Kasanda et al., 2005:1805).

Given the above rhetorical representation of LCE (which is consistent with emancipatory theories) and the normative positions adopted in relation to it, LCE could be viewed positively and as a victory for the inclusion of IK in education. It seems to suggest positive changes, as it advocates for pedagogy that is effective and emancipatory, problem-posing and dialogical, as well as a negation of the banking concept of education (Nekhwevha, 1999:491). However, the findings in this study suggest that the participants' views and the discourse of LCE that have been described in this study, have, so far, shown it to be an inadequate pedagogical tool for the successful integration of IK into EE. This version of LCE is in itself inadequate or inappropriate because it is located within a Western approach to education that recognises learners' cultural beliefs for pedagogical purpose, but which treats them as an inadequate knowledge system for development (see Siegel, 2002:810). In other words, indigenous views that learners bring to the classroom are embraced not because of the quality and the positive contributions that they can

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offer to education, but rather to be used to introduce, present and illustrate abstract theoretical concepts and contents. In fact, one could then cast reasonable doubt if such an approach should be called LCE, if in the end learners' conceptions from everyday life are essentially replaced with new science concepts or changed because they are considered scientifically wrong.

Yet another issue is that the Namibian curriculum is prescriptive in nature, with specified learning contents and objectives to be achieved. According to Schweinfurt (2013:11), it is challenging to be truly learner-centred when both teachers and learners have no control over the curriculum content. How is LCE possible when the conditions as to what need to be covered and at what pace are usually not negotiated in the classroom? How is LCE possible if there is a lack of adequate teaching and learning support materials that are relevant to the local situation? Even if teachers are prepared for, committed to and supportive of LCE, the contrasts with classroom realities and the demands of centralised curricula and examinations would made LCE practically impossible for many teachers. LCE should at least give learners the opportunity to identify some of the content and classroom activities and to participate to some extent at least in the assessment of their own learning. Despite these reservations about and discomfort with the ways in which LCE is conceptualised, it is important to highlight that this is categorically not an argument against sincere attempts by the Namibian government to address the injustice of colonial education. This is rather an honest attempt to expose the weaknesses within such conception, raise concern and rethink ways and ideas to inform curriculum praxis.

5.2 Reforming the environmental education curriculum

Although EE goals will never be achieved absolutely, the findings in this study suggest that there is a strong need for a shift away from a centralised, strong subject-based, content-focused and examination-driven EE curriculum. This change is necessary for the future health of society and the environment. Scholars have long argued that EE crosses traditional disciplinary boundaries and involves underlying interests and attitudes innocent of or even contrary to broad science issues related to social reproduction (Hart, 2002:1239). Barnhardt and Kawagley (2005:8), for instance, stress that EE does not entail the scientific-based understanding emphasised in the curriculum such as the one described above. They state that central to EE is "the potentially more difficult and politically sensitive task of helping children develop a more sophisticated and critical understanding of the values that inform everyday life" (Barnhardt & Kawagley, 2005:8).

Different educational models are present in the literature that have been suggested as ways to relate school knowledge (e.g. Western science) and local knowledge (e.g. IK). Some of the approaches, as recorded in some journals, are multicultural (Stanley & Brickhouse, 1994, 2001), cross-cultural (Snively & Corsiglia, 2001) and pluralist (Cobern & Loving, 2001) approaches, among others. The features of these three interrelating approaches are well summarised and illustrated with various scenarios in Waiti and Hipkins (2002:2006). However, in view of the current findings and the curriculum implication described above, the cross-cultural science-technology-society (STS) approach, as suggested by Jegede (1997:3) and Aikenhead (2000:49), appears to be a more promising and most viable option for the Namibian curriculum situation. In the next section, the STS discourse/movement and its improved version, 'cross-cultural STS', are briefly discussed and justified.

Cross-cultural science-technology-society education

The STS movement in science education has attracted national and international attention over the past three decades (Bennett, Hogarth & Lubben, 2003). According to Mbajiorgu and Ali (2003:31), the STS discourse emerged primarily as a result of social forces. STS emerged because of strong enthusiasm among educators and researchers around the world to make science education more appropriate and relevant to the lives of learners (Jegede 1997:3), increase learners' scientific literacy and achievement (Bennett, Lubben & Hogarth, 2007:347), increase environmental awareness (Rosenthal, 1990:28) and address the cognitive needs of learners aspiring to science careers and those seeking intellectual empowerment to participate thoughtfully in societal discourse (Aikenhead, 2000:49). Due to its potential benefits, countries around the world, such as Australia, Botswana, Canada, Israel, Japan, the Netherlands, Nigeria and the United States of America, have since adopted STS programmes in their schools (Chakane, 2003:103).

The premise of STS is that traditional subject disciplines found in schools do not fully prepare learners to respond effectively and knowledgably to contemporary challenges. As environmental challenges cut across the conventional lines of disciplines, STS too embraces such an approach. It suggests that "science education should include historical, philosophical, cultural, sociological, political, and ethical perspectives" (Pedretti, 1999:174) to fill a critical void in the traditional curriculum (Aikenhead, 2000:49). The STS approach places science content in a societal context

(Aikenhead, 2000; Mbajiorgu & Ali, 2003; Pedretti, 1999; Yager, 1993, 1996) and demonstrates in concrete terms that science and technology are major factors that will influence the future of the whole world (Aikenhead, 2000:49). This would essentially allow learners to relate and apply science content learned in classes to their day-to-day living (Aikenhead, 2000:49; Jegede, 1997:1) and to cope in an increasingly technological world (Yager, 1993:145).

Although STS has so far proven to be theoretically braver and more innovative in dealing with complex and multidisciplinary environmental issues, it is still largely focused on 'Western' science (Knudsen, 2004:9). Slay (2001:179), for instance, suggests that the concept of 'society' in STS should be replaced with 'culture', because non-Western education is not immersed in a society that is based primarily on science and technology. Aikenhead (1996:17) and Jegede (1997:3) express similar concerns, suggesting that the STS curriculum should be broadened to include non-Western views. Aikenhead (1996: 2) uses a concept of 'cross-cultural STS', while Jegede (1997:3) uses a 'conceptual ecocultural paradigm' as alternative conceptions relevant to Africa. Jegede (1997:3) draws on his international experiences in some parts of Africa to recommend that appropriate STS education with a tailored pedagogy incorporate cultural traditions into science has the potential for the present and future development of Africa. Jegede (1997:3) comments that the most idealistic way to improve STS education in Africa is to use the conceptual ecocultural paradigm, which consists of the following:

- Generating information about the African environment to explain natural phenomena
- Identifying and using indigenous scientific and technological principles, theories and concepts within African society
- Teaching the values of typical African humane feelings in relation to, and in the practice of, technology as a human enterprise.

According to Aikenhead (1997:229), cross-cultural STS education facilitates' border crossing between indigenous cultures (the everyday world) and the subculture of science. He opines that for learners from indigenous backgrounds to acquire the subculture of science, they must travel from their everyday life world to the world of science found in their science classroom. The teacher acts as 'travel agent' who guides the learners across cultural borders, resolves cultural conflict that arise along the way (Aikenhead, 1997:229) and ensures that learners are not being

assimilated in dominant Western culture at the expense of their culture. The 'collateral learning' theory provides a cognitive explanation of why many pupils, non-Western and Western, experienced culturally related cognitive dissonance in their science classes (Jegede & Aikenhead, 1999:45). Therefore, cross-cultural STS pedagogy emphasises the need to cross 'cultural borders' and establish 'collateral learning' so that learners can hold on to two or more alternative explanations of a phenomenon in a secure manner (Slay, 2001:173). Figure 5.3 below was adopted from Hofstein, Aikenhead and Riquarts (1988:358) and modified to accommodate indigenous cultures and technologies emphasised in a cross-cultural STS curriculum. The arrows in the figure represent the interconnections between society, indigenous and modern technology, and science.
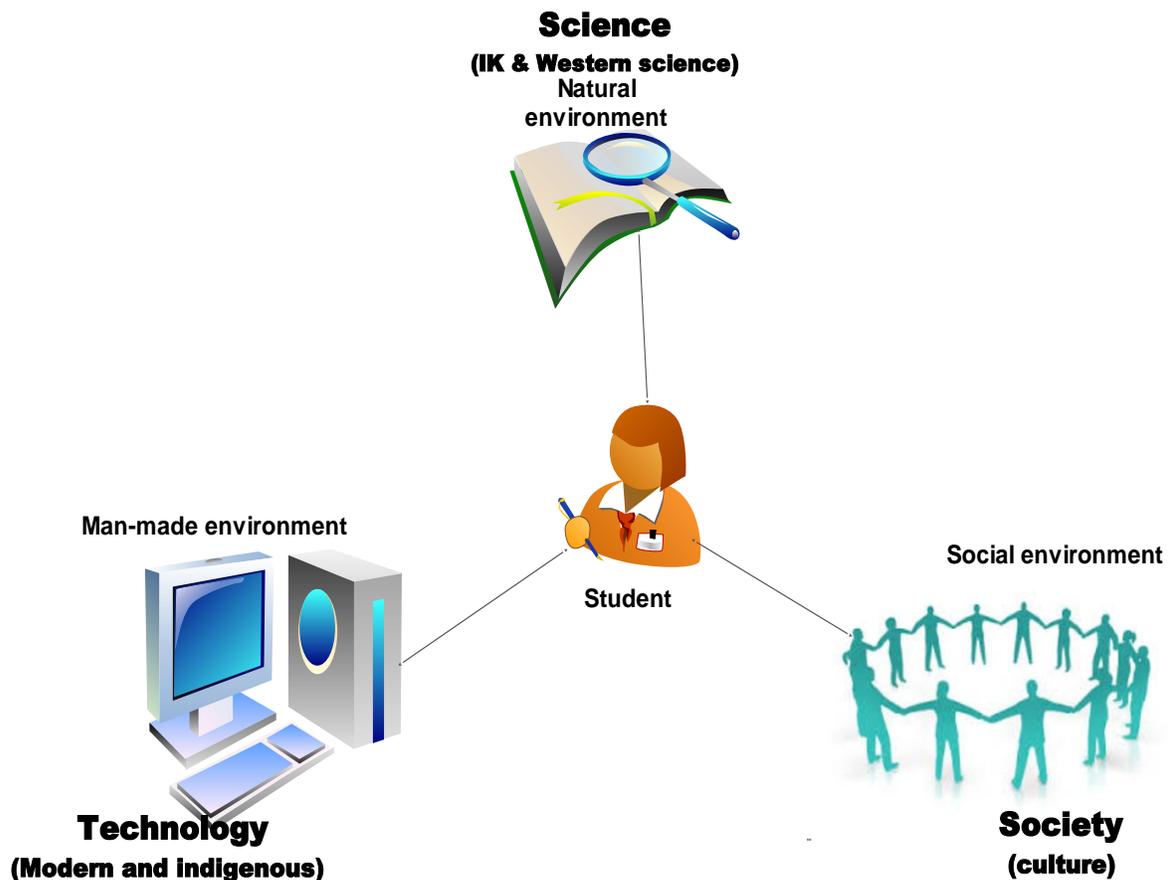
Fig. 5.3: The relationship between cross-cultural science, technology and society and learners (Source: Adapted from Hofstein, Aikenhead & Riquarts, 1988:358)

Therefore, the cross-cultural STS curriculum provides learners with a holistic learning experience that is drawn from both indigenous cultures and the subculture of science and

technology. It is with these reasons in mind that the cross-cultural STS approach is proposed as theoretical framework that would best guide the infusion of IK in the current decontextualised EE curriculum in Namibia. By adopting a cross-cultural STS curriculum approach, increased opportunities for indigenous perspectives, socially and personally relevant contexts, issue-based inquiry and multidisciplinary perspectives can be provided, which are missing from the current abstract, centralised, detached subject matter disciplines and examination-based curricular approach. Cross-cultural STS "is dedicated to a student-oriented, critical, and environmentally responsible approach to science, and it contextualizes Western science in the social and technological settings relevant to students" (Aikenhead, 1997:229).

*Making EE relevant to the local situation through cross-cultural STS: An issue-based approach*

The current case study, particularly the existing indigenous practices (see Section 4.5.3) and environmental challenges facing the region, could provide a graphic illustration on which to build an issue-based cross-cultural STS programme that would help learners construct meaning that is personally relevant and important. In respect of the findings in this case study, a topic on agricultural drought for instance, an issue currently affecting the region, can make sense to learners in various ways. The drought issue is a key example to infuse cross-cultural STS because apart from being context-based, its occurrence involves complex socio-scientific phenomena and interdisciplinary processes, and it calls for a cross-cultural approach in order to be explained and understood. In-classroom activities on drought, for instance, would include global and local environmental topics such as climate change, global warming, greenhouse effects, ozone depletion, population growth, pollution, water cycle and the adaptations of organisms' (the biological and physical characteristics of local plants and animals). The example below provides a general framework for exploring cross-cultural STS while teaching a topic about climate change (agricultural drought).

Firstly, the learners may be required to investigate, interpret, explore, manage, discover and make decisions about the occurrence of, and impacts of, drought on local agricultural production. The learners would be responsible for research using different pedagogical strategies such as projects, field trips, follow-up activities and involvement of local non-teaching human and material resources to generate relevant local and scientific information to explain and find possible solutions to the phenomenon. To this end, learners will be required to consult local

indigenous elders and farmers and modern climate sources such as meteorological services, the internet, radio reports, television and newspapers to find information on climate change and past drought incidences, experiences and human responses.

Secondly, the learners are responsible for analysing and presenting their findings from their particular perspectives. This could take the form of role play with other non-presenting learners given specific characters (farmers, traditional leaders, politicians, etc.), each with vested interest, to act and ask questions regarding their interest. Both indigenous and modern technologies have a legitimate place to contribute here. With respect to the current findings (by way of illustration), learners might learn any (or all) of the following indigenous perspectives: various indigenous climate forecasting indicators such as the flora (e.g. flowers) and fauna (e.g. birds) (Section 4.3.3.1), past historic drought occurrence, indigenous agricultural experiences and environmental management systems, drought-resistant local cultivar *(mahangu)* and grains storage system (Section 4.3.5.1.1), the use of a traditional agricultural calendar to manage herds (Section 4.3.5.1.2), the use of wild plants as food supplement during times of famine (Section 4.3.5.2.1), the values of caring about the fishermen downstream (Section 4.3.5.2.2) and other typical African values such as sharing with others.

In Western science, learners could learn how the current drought links to various meteorological and hydrological data, such as large-scale changes in the atmosphere, oceanic circulation, pollution, greenhouse effects, global warming and population growth. Once such linkage is established, scientific principles are introduced when required to aid understanding of the context. Learners would eventually recognise how their actions could have an impact on the environment. In a school garden and the local environment, for instance, learners can investigate the differences between actual and potential evapotranspiration, biological characteristics of indigenous plants, and how they adapt to harsh conditions, stages of growth, and physical and biological properties of soil using simple scientific equipment such as magnifying lenses. This would help learners to understand how organisms are interconnected through natural and biological systems and how a change in one system in the natural environment can affect the other Figure 5.4 below summarises the sequence of activities during the implementation of cross-cultural STS.

Level 4
Opportunities for learners to make changes and perform in citizenship roles
● **Assist members of rural society to develop and upgrade the skills needed to improve land productivity, such as crop rotation**
● **Relate to new technologies and respond creatively to future droughts**
● **Raise awareness of the use of contraceptives to effectively manage population growth**

SCIENCE AND IK

Level 3
Socio-political and historical knowledge
● **Evaluate the impact of official government policies and legislation: Determine how the Communal Land Reform Act 5 of 2002 has affected poor communal farmers and livestock mobility**

Level 3
Science
● **Use scientific information to explain the occurrence of drought – learners could learn how the current drought is linked to various meteorological and hydrological data, such as large-scale changes in the atmosphere, oceanic circulation, greenhouse effects and global warming**

Level 3
Indigenous and Western agricultural technology
● **Evaluate the impact of scientific and indigenous technology on the land, e.g. the impact of using a compactor or a ripper on water penetration**

INDIGENOUS AND WESTERN TECHNOLOGY

Level 2
Science Skills
● **Investigate the differences between actual and potential evapotranspiration, biological characteristics of indigenous plants, stages of growth**
● **Investigate physical and biological properties of soil using simple equipment such as a magnifying glass**

Level 2
Indigenous skills
● **Conduct interviews and discussions with indigenous elders and farmers to access historical drought data**
● **Indigenous climate forecasting, agricultural methods and technologies, drought-resistant plants, grain storage systems, the use of an agricultural calendar to manage herds, the use of wild plants as food supplement and learning about typical African values such as sharing and caring**

Level 1
Society
● **The drought problem is drawn from learners' everyday experience**
● **Describe how drought directly affects the learners, their families, agricultural production and the economy of the country**

SOCIETY

Fig: 5.4: Schematic representation of teaching a topic on agricultural drought in a cross-cultural STS environment

Source: Adapted from Malcolm, and Doidge (2012:4)

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Thirdly, the learners will then assess the status of accessibility and the use and appreciate the differences between indigenous and modern sources of information on climate change and drought preparedness. They would merge IK with science understanding/methods of inquiry to evaluate the impact of scientific and indigenous technology on the land and draw up an action plan for lobbying to solve the drought-related problems, as based on recommendations by Waiti and Hipkins (2002:2006). For example, learners would compare how a compact tractor, which only furrows through the top layer of land, and a ripper tractor, which furrows through the hard pan, have an impact on water penetration. They can also explore the benefits and challenges of using local and improved cultivars (Section 4.3.5.1.1). Through cross-cultural comparisons, learners come to understand that all classification systems, Western and indigenous, are influenced by the observations available and respond to particular cultural needs (Kimmerer, 2002:432).

The cross-cultural STS approach would also require learners to assess and evaluate the impacts of usually neglected socio-political and historical practices on the environment. Instead of treating drought simply as a consequence of climatic harshness, overpopulation and ignorance or poor land mismanagement such as overstocking, by contrast, cross-cultural STS recognises the role played by official government policies, legislation and business interests in controlling the production and distribution of resources (Hodson, 2009:3), including examples of the systematic adoption of law such the Communal Land Reform Act 5 of 2002, which allowed privileged farmers to buy and fence off 20 hectares of communal land at the expense of poor farmers. This mostly has an effect on poor farmers grazing their livestock in already densely populated areas, thereby increasing their livestock's vulnerability to drought, soil impoverishment, top soil depletion, poverty and insecurity (Hodson, 2009:1), and eventually increasing reliance on annual government drought food relief supply. Learners would understand the reason why there are inequalities and injustices within the society and that drought is also embedded in socio-political and historical practices, values and interests.

Finally, one of the basic features of STS is to use appropriate learner-centred activities to build in opportunities for learners to extend beyond the classroom to their local communities to make changes and perform in citizenship roles (Yager, 1992:9). This may include assisting members of rural society to develop and upgrade the skills needed to improve land productivity, such as practising crop rotation, relating to new technologies and responding

creatively to future droughts, and raising awareness of the use of contraceptives to manage population growth in the area effectively.

This example broadly illustrates how Western science can be taught alongside IK to teach a context-based problem in a cross-cultural STS curriculum. The proposed cross-cultural STS approach has drawn support from many indigenous and Western educators and scholars all over the world who advocate for instructional strategies that capitalise on knowledge already existing in the learners' culture and curriculum content that integrate different knowledge systems in local communities (Aikenhead, 1996:217; Dei, 2011:313; Jegede 1997:3). Teaching IK alongside Western science in an STS environment is perhaps the best way to teach environmental issues with sensitivity to cultural difference and to improve access to science education for all learners. In the words of Rixecker and Putaio (1999:226): "Increased learning in cross-cultural communication needs to be a fundamental pillar in environmental education no matter what its mode of dissemination. This is necessary if multiple and diverse futures are to be generated in a postmodern world".

Therefore, the type of education that is needed for youths to be able to transform communities should place their experiences, cultures and prior home/community knowledge at the centre of learning (Dei, 2011:313). It should provide learners with the necessary knowledge and skills to work in the local communities in a way that sustains and revitalises local culture, while acquiring credentials and knowledge that would enable them to develop their careers beyond local settings (Ball, 2003:87). At the same time, local experts who have a vast body of relevant knowledge and skills would have the opportunities to help teachers and learners to learn about agriculture and the local environment. Parents and community members can also learn new ideas, methods and techniques from Western science through their children and teachers (Vandenbosch, 2007:1).

5.3 Limitations and recommendation for further research

Teaching cross-cultural STS may pose several daunting challenges to educators and learners, especially as it involves a radical shift from conventional curriculum practices such as syllabus-driven, academic topics and teaching for examination. This issue did not fall within the scope of the current research. What has been presented here is a simple answer to the main research question posed at the beginning of this study: How can IK be used to support EE in selected Namibian rural schools? To arrive at the current answer, special attention was

given to widely accepted and fundamental principles of EE, such as interdisciplinary, transboundary, contextualisation, cross-cultural and taking action on environmental issues. Cross-cultural STS education provides the best answers in comparison to other models proposed in the literature. However, as this research was a qualitative case study among teachers, advisory teachers and traditional leaders involved in the education in two rural schools, the conclusions made in this study are specific to these participants' experiences, attitudes and views with regard to the use of IK in their local context. As most rural schools in this part of the country have similar social and cultural settings, it can be assumed that the results are generalisable to other rural schools. However, such conclusions would have to be supported or verified through further research.

Of course, the intention is to give over the entire science curriculum to this cross-cultural STS approach, but it would be naïve to think that such a radical move is likely to be embraced any time soon in Namibia, as it requires a substantial redesign of the entire school system. However, the most viable option at the moment is to implement it in a conventionally established science subject such as Life Sciences as a starting point. Therefore, a pilot study is recommended in this regard to provide further detailed evidence of the potential benefit of a cross-cultural STS curriculum in the local context.

5.4 Conclusion

In conclusion, the findings of this study indicate that environmental topics such as those related to social, economic, political and biophysical issues are usually taught within separate subject disciplines in schools with less or no linkage between them. At the same time, IK is not only ignored in schools, but also systematically undermined as a potential source of knowledge for development. Both the analysis of the national curriculum documents and the interviews with traditional leaders, advisory teachers and teacher showed that IK is rarely accessible to the majority of young people, including teachers themselves. However, this research was based on the premise that IK is an enabling component of sustainable development and that rural communities can make valuable and unique contributions to education. A variety of indigenous innovative resource-management strategies, customs, potential and practical agricultural practices and rationales that necessitate the promotion of these practices have been identified in this study. Many international and regional events on sustainable development and EE have reiterated that IK should have a prominent place in EE lessons so as to contextualise the learning programmes. Regrettably, it is noted that the

potential contribution of IK to EE is less assured, and that overcoming the many practical and conceptual barriers that have been identified may require considerable effort. The most prevalent conceptual barriers among the participants are related to the definition of IK and EE. The practical barriers and perhaps the most challenging ones to the integration of IK and EE in a holistic approach are related to the way the curriculum contents and material are designed. Recommendations were made based on these findings and the theoretical assumption informing this study. To reiterate, the theoretical assumptions guiding this study were drawn from Turnbull's (1997:551) notion of a "situated knowledge position" (see Chapter 3) and other post-colonial theories that recognise the differences between IK and Western sciences, but at the same time are concerned with ways in which the two can coexist.

Moreover, the findings also suggest that dealing with the complexity and uncertainty of environmental problems requires a significant shift from current abstract, centralised, detached subject matter disciplines and examination-based curricula to a contextualised, interdisciplinary and cross-cultural approach that combines both locally generated knowledge and knowledge from established canons in the Western academy (Ball, 2003:87). In other words, the current subject discipline in which EE is integrated does translate into economic development or environmental responsibility. EE, especially with its inevitable link with multiple disciplines and transboundary environmental issues, necessitates special attention to the practices and ramifications of cross-cultural learning (Rixecker & Putaio, 1999:225). Therefore, a contextualised, issue-based, cross-cultural and interdisciplinary approach that would best prepare learners to compete and live harmoniously in the everyday life world and the world of science is imminent (Ball, 2003:87).

Cross-cultural STS curricula that include a broad range of disciplines from natural sciences, social sciences as well as the humanities and that provide a framework within which all knowledge systems can be equitably compared and can contribute to knowledge of sustainable development are proposed. The environmental problems in Namibia are immense and complex. Local environmental issues such as drought, overgrazing, pollution, poverty, inequality and social injustice and global issues such as ozone depletion, global warming and climate change require holistic and multiple ways of thinking so that learners can deal with the complex webs of relationships. Instead of placing emphasis on competitive academic subjects, a situation that prioritises end-of-course examinations (Vandenbosch, 2007:1), cross-cultural STS encourages the development of locally relevant skills that would help

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learners to solve everyday problems. Finally, it is hoped that this research would open 'a can of worms' in one of the poorly researched areas in Namibia and expose the myth that the Western civilization is superior.

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Appendix A

GENERATING INITIAL CODE

KEYS FOR PROFILE: T1 = TEACHER 1; T2= TEACHER 2; T3= TEACHER 3 T4 =TEACHER 4; AT1= ADVISORY TEACHER 1; AT2= ADVISORY TEACHER 2; TL1=TRADITIONAL LEADER 1; TL2= TRADITIONAL LEADER 2

Profile	Data Item	Initial Codes
	1. Participants perceptions and understanding of the terms environmental education and indigenous knowledge	
AT 2	Indigenous knowledge, this is the knowledge that exists before education. We are talking about the skills, we are talking about the values and we are talking about the attitude that our people have before education. Those are the things that we learn from home without anything, without technology. What should I need to know, what can I learn from my parents. And environmental education, I think this is more on sustainable development or it is more on how can we take care of our environment it is stay or preserved. I did environmental economics at the university but that was more on how can we use resources sustainably.	IK is ancient IK skills, values and attitude IK learned outside formal education IK not involve modern technology EE = sustainable development EE is caring and preserving nature EE Sustainable use of resources
AT 1	I understand indigenous knowledge as knowledge that we have acquired from our parents because it is also in a way I understand it that it is also education from our parents. If we talk about education, it starts at home, from the parents and from the community where we live. And that is why it includes norms, it includes the way the resources are used, the natural resources are used and the attitude as it was said but mainly the skills on how to handle things or how to use natural resources	Parents IK source IK part of home education Community is involved in IK transfer IK includes norms, skills and attitude
T 1	In Africa we are having our own way of science. Our forefathers in the past, they have used their common understanding …. Let me say they use to estimate how the harvest will be as we said earlier that they can even look at the flowers or the birds that are flying to tell that this year we are expecting a lot or … not. For example … we are having people who can heal certain diseases but they were not educated on it, that is just an African way of science and they have inherited either from people who are gone already	IK is science IK derive common understanding IK used to estimate weather patterns IK is spiritual
T 2	I understand it (IK) like the way people in a community on in the rural areas how they understand or how they are doing things in their traditional way of doing things. And if I can give you an example; people in the rural areas are farmers, they are involved in farming activities and the way they are doing these activities they do them in the traditional way; being it is cultivating, looking after animals farming with animals, grazing and all those things. They do it in their traditional way. Meaning that, they apply	IK is rural IK about Agriculture, farming IK not involved modern technology

T 3 **T 4**	the knowledge which they have. By saying that it means that they do not involve in modern technology or whatsoever. That's in short of how I understand the indigenous knowledge. an understanding of experiences that is (sic) from the **local environment** where by a person is just learning **through observing** and looking at the way the local people behave, the way they act, the way they say things and such knowledge is not from elsewhere it's just from within the environment where the person is living and also the **knowledge where the person gets from ancestors** of those people have been doing and how those people have been doing things (SHI/P1). …indigenous knowledge, this is the knowledge that I think you get from your surroundings, from where you grew up so as you grow up in the community… The environmental education again … you are educating yourself or you are being educated about your environment where you live. Of course when we are talking about the environment then we have to think about the rainfall, the water as well as the land …How we are taking care of them in a sustainable way so that they will not be used up…that's all what I have	IK is local embedded IK derive from Observation local embedded IK passed on from ancestors IK is embedded in local EE & Biophysical environment Sustainable way
AT 2 **AT 1** **T 1** **T 2** **T 4** **T 3**	I think there is a relationship because if learners are taught about what is all about their environment then these learners are just continuing with what they have learned from their parents. Well, it (relationship) depends because if we talk about environmental education at school, to understand what the environment… the focus might be on how to handle the resources in the society; in the nature. Yes, of course they do have a relationship because when we are talking about environmental education which is where the children are taught about the environment and about indigenous knowledge The relationship between the two, for instance let me say sometimes we talk about the importance of trees or to be precise indigenous trees. One of their importance is that, they can be used as traditional medicine meaning that, that is an indigenous knowledge because we are talking about traditional medicine Well, the relationship is there between the indigenous knowledge and environmental education of course. Here the reason why I am saying the relationship is there of course we are just learning things from the surrounding. Now with the indigenous knowledge we said this is something that we are learning from where we grow up for example I am having the same idea [as above]. So people already have knowledge about the environment so environmental education so meaning that people they are just polishing or they are just trying to improve and develop skills	The is a relationship between IK & EE The is a relationship between IK & EE The is a relationship between IK & EE Both EE & IK focus on importance of tree The is a relationship between IK & EE The is a relationship between IK & EE

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	which is already there, so we are just building on what is already existing	EE polish exiting skill (IK)
	2. 2. Participants perceptions and understanding of the terms environmental education and indigenous knowledge	
T 2	Yes, I think it is important to integrate the indigenous knowledge in education... The reason in that based on the example which we have already given like … traditional medicine and now we have students... studying to become scientists while some are studying to become medical doctors. So, having that knowledge or that indigenous knowledge that some of the traditional trees have relative importance, so I think it will help them in their studies, in their researches and also for example to come up with modern medicines using the indigenous knowledge and plans.	IK integration necessary IK could advance science
T 3	yes, yes, it [integration] is important, because now people already have that knowledge so they cannot change that knowledge which is already existing into a new knowledge unless otherwise you can just improve or develop the skill which is already there.	IK integration necessary to develop existing skills
T 4	Yes, it is very important, with the idea that if we are integrating the two now, we are putting the knowledge together… the western knowledge and the indigenous knowledge … it is very important to integrate them because now we know from the other side and we combine with what we know already in our surroundings.	IK integration **very** important IK integration provide multiple knowledge perspective
AT 1	Yes, I think it is very much important to integrate it because most of the important skills we may learn from our parents so that it doesn't get lost. Because it seems we don't really respect and acknowledge our own, be it knowledge or skills we are having. So this seems to be overtaken by western way of doing things. And it is not easy because in some cases we don't respect ourselves also or having that motivation that we can do something and we always feel like this is not important. Let us say for example we come to our "omahangu". When we sell Omahangu ourselves we feel like, no this is expensive. You know, but omahangu is something that is very much important to us. But as someone we don't expect it to be valuable and now since some technology came in, our indigenous knowledge is pressed down and we might end up with the future generation not knowing anything about what happened in the past. So, some are quite essential. I mean the skills are essential in the society still. It is just a matter of upgrading them maybe, but our learners don't really have that… (They) have not been taught in way that they get to respect their values. So I think it is quite important to have this indigenous	IK integration is **very** important To preserving IK IK not respected or acknowledge IK replaced by western knowledge Don't believe in ourselves Indigenous plant not valued IK is replaced by western science IK is getting lost IK is still essential IK need to be upgraded Learners not taught to respect IK

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AT 1	knowledge	
	(We) need to engage with parents, more especially elders who have matured knowledge about the environment. This will not only help our learners to know about their environment but it will also expose our limited understanding about the environment we are living in. Also integrating IK in education will give parents the opportunity to contribute to teaching and learning in school because now parents are not really involved because they don't understand things that we teach. But as soon as their knowledge is included in the school they will be able to contribute on what they know. They will even be helping learners with assignment at home on that indigenous.	Parental involvement
TL 2	I think it (integrating IK) is important because if it is not integrated where else can our children learn about their culture? Nowadays, our children do not listen to us anymore. Who would believe you if you say we are expecting minimal rainfall by just looking at some termite or aloe vera flowers? But I think if such information is given to children at school they will believe it. (TL2: 14 June 2013)	For learners to learn about their culture To validate IK
AT 1	I think it is **very much important** to integrate it (IK) because most of the important skills we may learn from our parents so that it doesn't get lost. Because it seems we don't really respect and acknowledge our own, be it knowledge or skills we are having. So this seems to be overtaken by western way of doing things (AT 1: 19 June 2013)	Integration **very** much important To preserve IK
AT2	… now since some technology came in, our indigenous knowledge is pressed down and we might end up with the future generation not knowing anything about what happened in the past. So, some are quite essential. I mean the skills are essential in the society still .It is just a matter of upgrading them maybe. But our learners don't really have that… (They) have not been taught in way that they get to respect their values.	Preserving IK Respecting cultural values
T2	(W)e do not ignore indigenous knowledge in our lessons or in our practice in schools. Because like our subjects… agriculture or Life Sciences, most of the topics which we teach the learners, they are more familiar. Even not in modern ways but in traditional ways. That is why we have to ask them on their knowledge's, previous knowledge. When we talk about previous knowledge in most cases we have to refer to the indigenous knowledge which they already know or acquired from their parents the way they are brought up and that is why we have to refer before we introduce the modern. (T2:19/07/2013)	IK is the basis on which modern agricultural methods can be learned
T1	IK is the foundation where we base our modern knowledge because … before knowing commercial farming you already knew that people do farming. You know already that when you were a young boy you used to	IK is the basis on which modern agricultural methods can be learned IK is the basis on which

	look after cattle or goats and that is farming. You knew already that we used to cultivate using our hoes that is traditional way of knowledge. That is the way we use our traditional knowledge in farming but commercial farming you will now understand it more better having already that knowledge that traditionally we use to farm like this, now this is just a kind of advancement just advancing what we already know. That indigenous knowledge or that traditional knowledge that we have will help you now to understand more concepts in the advanced stage. (T1:19/07/2013)	modern agricultural methods can be learned IK helps learners to understand science concept
	3. working frameworks, guidelines, methodologies or training programs on IK	
AT 2	Maybe, we have that department of where people weave baskets, isn't it? (while looking at Advisory 1)	Baskets weave program Participants not sure
AT 1	Yes (agreeing). That is more of traditional assistance culture that recognize songs the culture of where learners learn different songs and dances. They can also come up with dramas to demonstrate	There are programs on tradition songs and dances
T 1	I do not think so. I don't think there is.	No program on IK known to teachers
T 2	I haven't come across that kind of program	No program on IK known to teachers
T 3	*shaking his head* I don't think there is such a program apart from that one for life skills.	No program on IK known to teachers
T 4	I think if I just look at where we are now, in my own case I think I only know of (traditional) life skills and these people now they are also bringing in culture and I really don't know if we really have other things apart from the life skills.	No program on IK known to teachers
AT 1	Some of the ways is (sic) catered by agriculture or by Art… Home Ecology. Those things they might bring in some knowledge that are (sic) indigenous. The way of cultivating mahangu, the way of weaving baskets and the way of cooking some traditional food, the way of making huts maybe those are the subjects that cater for indigenous knowledge	Some IK integrated in other subject
AT 2	They are not catered for and that is why we want to traditionalized skills for learners to learn different things that parents know and that can help them in life.	Most IK not catered for
AT 1	I think also that, we had something where we looked it but now initially…the initial focus of life science before it has changed to biology the way it is now. …I think this was really something good for learners to know. …like we have some types of bushes or herbs or shrubs to be used as insect repellents or so. This was more emphasized in life science	IK was catered for in the past IK is used in insect management IK moved away from initial focus

	initially. Unfortunately I think now that has moved away and the way it is taught it is not toward that direction anymore. Its more moving away to more biology than it was supposed to be development	
AT 1	**4. Challenges to the integration of indigenous knowledge in environment education** I think the syllabus or the curriculum is the one that guides teachers and you know that exam driven tendency sort of is still prevalent within education system. Thus, if teachers could have… I mean some basic competencies that could cater for this (Indigenous knowledge), but the teaching (now) goes on because of this competition. And now they don't have much time to focus on prior knowledge of the learners and also to focus on general information about a specific topic or concept. Now they are more focusing on just examination for leaners to know these facts which really deprive learners from getting general information. And the way they teach is more of teaching for examination but not giving learners to explore and preparing learners for the future. When we do school visit that the picture that we get from schools and it doesn't really promotes the exploring of indigenous knowledge if one would say.	Exam driven education IK is neglected because of competition Learners' prior knowledge not considered Teaching for examination deprive leaners general info Leaners not prepared for future (Exam driven)IK not promoted at school
AT 2	Yes it true, it supposed to be like that. Teachers start from what the learners know and what learners (mostly) know is their indigenous knowledge. But because of this competition truly, teachers are just teaching. … Most teachers forget that learners are learning for life. I learn to use this knowledge in my life. I don't learn for examinations. It should make sense in my life. It should help me to grow. But if you are just teaching the subject that means I am only teaching what the syllabus is telling me and I should not add the practical or the real life example that learners need to know and they need to apply in their life. How it links to the way I live and what difference am I making (in learners life).	Competition deprive leaners to learn IK Learning for life not for exam Teaching and Learning is not contextualized
T 1	In mainstream education, let me say you can even find a certain learner who's been absent from school because he or she was taken to traditional healers simply because he/she was bewitched which is not true. Those are some of the gaps that we are experiencing because even some people don't understand it because witching is not based on some scientific explanations. It's not real. It is not proved and it cannot be! (T1:19/07/2013) Normally, we do not say it [IK] is wrong. No, it is not wrong because that	Negative attitude toward IK Negative attitude toward IK

profile	Data Item	Coded for
T 2	is what they used to do. But we just have to explain that the way we do it is, like in terms of Agricultural and Life Sciences where we used to cultivating (sic) using scientific methods. We have to tell learners that this is a traditional way of thinking and that is the reason why the land becoming degradated (sic) and so on and then we have to now introduce the scientific way of doing things. Not really that I am saying they are wrong. (T2:19/07/2013).	IK is not ignored Learners are familiar with EE topics Teacher ask learner previous knowledge Pre-knowledge is relate to IK Promoting scientific method of cultivating at the expense of IK IK is linked to land degradation Scientific knowledge linked solution
T 4	Yes, hmmm those things, we do not ignore indigenous knowledge in our lessons or in our practice in schools. Because like our subjects like agriculture or Life Sciences most of the topics which we teach the learners they are more familiar even not in modern ways but in traditional ways. That is why we have to ask them on their knowledge's, previous knowledge. When we talk about previous knowledge in most cases we have to refer to the indigenous knowledge which they already know … before we introduce the modern	
T 3	Like in terms of agricultural life sciences where we used to cultivating using scientific methods. We have to tell a learner that that is a traditional way of thinking and that is the reason why the land becoming degraded (sic) and so on and then we have to now introduce the scientific way of doing things not really that I am saying they are wrong.	Ask learners to consult parents
T 3	yes, if it comes for example to life sciences we are talking of deforestation here and there and then of course sometimes we might ask the learners to go and find out how was the place where they are living now were there trees or something like that. Normally we send them to go and ask the parents and find out, well I am not too sure.	Some IK are being taught
T 2	(L)ike our understandings, experiences that people … use in local environments there are still ways I mean people are still being taught how to store, how to treat like they are still using that knowledge like how to treat certain parasites that affect plants to prevent them from damaging the plants and there are still so many ways on how to treat animals.	Traditional methods of storage Traditional methods of controlling parasites
TL 1	people in the rural areas are farmers, they are involved in farming activities and the way they are doing these activities they do them in the traditional way; being it is cultivating, looking after animals, farming with animals, grazing and all those things. (T2:19/07/2013)	
TL1	In our community we use traditional methods of cultivating although nowadays we are also using tractors to plough our mahangu fields. But most of the methods that we use are those that we learned from our parents. (TL1:16/07/201)	Agricultural activities Agricultural methods

profile	**Data Item**	**Coded for**

	5. What environmental education can learn from existing indigenous environmental practices?	
TL1	Since we do not have mineral resources in this area our people survived/depend on <mark>livestock and crop farming</mark> though they also <mark>keep various trees and plants such as palm trees, bird plum, marula tree and others</mark>. Our people took care of these plants because it was the only source of food that they could depend on during drought season (coughing). <mark>Palm fruits were not wasted and the palm trees were well-looked-after. The palm fruits were/are not harvested until ripen. If the fruits are in excess, it is stored in baskets</mark>	Livestock and crop farming

Wild fruits

protection and storage fruits |
| TL1 | if you read at the <mark>beginning of the act you will learned that I need to consult senior headman/women or members of the traditional authority to find out if traditional laws/regulations are put in practice</mark>

Traditional authority leadership consists of me as the <mark>Chief or chairman of the Uukwambia traditional authority. There are six senior traditional leaders also called Senior Traditional Council. Under each Senior Traditional Council there are about seventy (70) to eighty (80) villages and Village Headmen /women in that range</mark>

If it is approaching the time for cultivation, <mark>there is a law that no cucashop/Shebeen to be opened before two o'clock</mark> in the afternoon

<mark>Conserving water is not something new</mark> that comes with the introduction of tap water. Ever since, water has been conserved and that is why even our oldest water pans and lakes that keep water for a long time such as Amungali and others <mark>are assigned to someone (man) to look after it until the water subsides and people are than allowed to start fishing</mark>.

The beauty of Northern region landscape is observed in trees and shrubs, however this elegance is now depleting in our area. The <mark>lack of knowledge</mark> on the importance of trees and plant has led to reduced rainfall in our area.

During the olden days it was not permitted to use fresh woods/sticks. Only recently that people started to use fresh woods/stick. (5 seconds inaudible segment) Even the palace does not use fresh woods/sticks

Those that do not obey them it is just because of <mark>lack of understanding. Another thing is that people misunderstood things after independence. They though that when the country is independent, you are allowed to do whatever you want. Thus if headman instruct them not to do certain things, they will think that people are being oppressed</mark>. The understanding was so limited, but it has improved so far | Community development- consultation and power sharing

Community development- leadership

Enforcement of traditional laws and regulations

Conserving of water

Lack of knowledge leads depleting environment

Limited understanding of freedom |
| | <mark>We also have some important plants in our area and some could be used</mark> | Traditional medicine Primary health care: The |

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TL1	for traditional medicine to cure diseases such as Edombo (*Aloe zebrine or tiger aloe)*. Tiger aloe is a respected plant that grows in oshana (open space in Oshiwambo). Even before the introduction modern medicine our people have been using Tiger aloe. It has been used to tree chickens by mixing it with water. It can be used to treat a wide range of animals thus it needs to be conserved in our environment.	use of Herbal medicines
	Our people took care of these plants because it was the only source of food that they could depend on during drought season (coughing). Palm fruits were not wasted and the palm trees were well-looked-after properly. The palm fruits are not harvested until ripen. If the fruits are in excess, it is stored in baskets. During drought, when there is no enough food people would than use the stored palm fruit and eat it with (mahangu) porridge . Even when people started going to school, there wasn't modern food and children were given "oshinkendendenga" made from squeezed bird plums. (TL1:16/07/2013)	plants and plant resources conservation Use of plant resorces
TL 2	In our community we use traditional methods of cultivating although nowadays we are also using tractors to plough our mahangu fields. But most of the methods that we use are those that we learned from our parents. I remember some years ago were told through radio and meetings to use the newly introduced mahangu seeds called "Okashana". This Okashana grows and ripen very fast than our normal mahangu crop. You should know that the rain in our area starts somewhere in November till April there. Now this Okashana get ripen and dry before the rain stop and you cannot harvest it because if you harvest it and take it to "oshipale" (an open space where the millet heads are kept to dry further) and when the rain come the millet heads will get destroyed. Even the Okashana stalks are very thin compared to our normal mahangu. When there is heavy rain and wind, the crops are blown away and you will find the whole mahangu field on the ground. In our area, the mahangu/millet stalks are used for building houses and thatching hats but since Okashana stalk are very thin they are not good as our local mahangu. But when it was introduced people well not well informed. Now if you look in our community most people hardly uses it. I also do not use it that much, more especially these days when there is flood.	Traditional methods of cultivation Okashana an improved cultivar Advantage of the cultivar Disadvantages of the improved cultivar express dissatisfaction with the quality of the cultivar
TL 1	For "omalwenge" you need to be given permission because this is authorized by the traditional authority. You just don't put you livestock in the field because there might be others with their pearl millet yet to be harvested.	Grazing feast and livestock management
TL2	We make sure that people do not start catching fish before it reaches other place. Other people also need at least see them (fish) moving in their oshanas. Especially, no one is allowed to start catching fish with a net before the flood water reaches Ombuga (desert) where most rivers end.	Controlling fishing in the upper parts of the oshanas to allow fish to reach fishermen downstream

(TL2:23/07/2013)	

Appendix B

Interview schedule for teachers

Research topic: Indigenous knowledge and Environmental Education: A case study of selected schools in Namibia

Introduction Good morning (*afternoon, evening)*

My name is Elieser Sheya and I am Master student at Stellenbosch University. As part of master program, I am required to carry out a research on a topic of my interest. The title of this study is written above. I conducting this interview in order to better understand how indigenous knowledge could be used to support environmental learning in rural schools.

Let me assure you that the information you provide will be kept in strictest confidence. No one except my supervisor will see your answers. Your information will be combined with answers we get from other six participants. Your participation is completely voluntary, and you do not have to answer any of the questions you do not want to answer.

The interview will take about 30 to 40 minutes (or more, depending on the number of questions to be asked). I realize your time is valuable, and I will try to get through the questions as quickly as possible.

Demographic information for the interviewed:

1. Can you please introduce yourself?

   a) Qualification

   b) teaching experience

   c) cultural background

Perceptions and understanding

2. What is your understanding of the following terms?

   a) Environmental Education

   b) Indigenous knowledge

3. In your opinion, what is the relationship between indigenous knowledge and environmental education?

4. Do you think the integration indigenous knowledge in environmental education is important in Namibia? Give reasons for your answer

5. To your knowledge, are there any working frameworks, guidelines, methodologies or training programmes support the use of IK in schools or EE?

Existing practices regarding IK and EE

6. To what extend is indigenous knowledges included in your environmental education/Life Sciences lessons?

7. Do you encourage students to learn, respect and promote indigenous ways of living?

Opportunities and challenges

8. What do you see as the anticipated contributions of indigenous ways of knowing to learning and teaching? With regards to:

   a) Improving conceptual understanding of the environment?

   b) Active participation of different role players in environmental education?

   c) Finding solution to escalating environmental problems?

9. What do you think are the challenges that need to be addressed to successfully optimize indigenous ways of knowing in schools?

10. What do you think should be done to mobilised IK be to enhance environmental learning within the school curriculum?

11. Is there anything that you would like to add?

Appendix C

Interview schedule for Traditional Leaders

Demographic information

1. Can you please introduce yourself in short?

    i)   cultural background

    ii) When and how do you become a traditional leader?

    iii) What is your role as traditional leader in your community?

Existing practices regarding IK and environment

2. According to the Traditional Authorities Act, No. 25 of 2000, it is the responsibility of traditional leaders to safeguard and preserve the environment and at the same time ensuring that natural resources are used in sustainable ways. How do carry out this constitutional mandate?

Perceptions and understanding

3. In your opinion, what is the relationship between indigenous knowledge and environment?

4. What can indigenous ways of knowing contribute to our learning about and understanding of the environment?

5. Do you think indigenous/traditional ways of preserving, learning and understanding the environment should be included in mainstream education?

6. How can mainstream education learn from indigenous elders and knowledgeable others about our environment?

7. What do you think should be done to encourage teachers and learners to embrace, respect and promote indigenous ways of knowing in enhancing environmental learning within the school curriculum?

8. In your view, do you think indigenous languages have an important role to play in learning about the environment?

Appendix D

STELLENBOSCH UNIVERSITY
CONSENT TO PARTICIPATE IN RESEARCH

Title of the research project:

Indigenous knowledge and Environmental Education: A case study of selected schools in Namibia

You are asked to participate in a research study conducted by Elieser Sheya (Qualifications: Basic Education Teacher Diploma, Specialised Diploma in Education, B.Ed.Hons) under the supervision of Prof LL Le Grange from the Education Faculty at Stellenbosch University. You were selected as a possible participant in this study because you are a Life Sciences teacher and environmental concerns are strongly incorporated in the new Life Science Curriculum for grades eight to ten. Therefore, I believe your knowledge and experiences will help me to obtain the information required for the completion of my thesis.

1. PURPOSE OF THE STUDY

The general aim of this study is to explore ways in which Indigenous Knowledge and western knowledge can work-together to support environmental learning in rural schools in the Omusati region

2. PROCEDURES

If you volunteer to participate in this study, we would ask you to do the following things:

You will be asked to participate in an interview session lasting not more than 40 minutes. The aim of the interview is to enable me to gain insight knowledge about your experiences as a Life Science teacher. The interview will be done during your free time and it consists of questions about:

- Your demographic information such as qualification, teaching experience and cultural background
- Your views and understanding of Indigenous Knowledge and Environmental Education
- Your opinion regarding the relationship between Indigenous Knowledge and Environmental Education
- Your views on how indigenous knowledge can be used to support environmental learning

- You would also be asked to identify (if there is any) opportunities and challenges of achieving the integration of IK in environmental learning.
- Your general views about the topic

3. POTENTIAL RISKS AND DISCOMFORTS

In this study project, participant will be asked about their views and understanding with regard to indigenous knowledge and environmental education. One possible discomfort is that indigenous knowledge is an unfamiliar concept in the Namibian curriculum, and as a result some participants may find it difficult to conceptualize and understand it. Likewise, there is no such subject as Environmental Education within the Namibian schooling system. Thus, the term is not commonly used in schools. The lack of such distinctive use of the term may cause participants to think that they are not involved in Environmental Education. However, Environmental Education is a cross-curricular subject, and environmental learning takes place across the entire curriculum, and in all the aspects of schools. In other words almost every teacher teaches about the environment. Therefore, I hope that the participants will find indigenous knowledge interesting and useful alternative source of information that can enhance our learning and teaching about the environment.

4. POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Although this research project will be presented in partial fulfillment of the requirements for the degree of Master of Education in Curriculum Studies (Environmental Education) at Stellenbosch University, I also believe that this study will be of great benefit to future curriculum innovation in Namibia. More especially that Namibian curriculum is still based on Western approach to education that rejects indigenous ways of knowing as unscientific. This research would contend that knowledgeable elders should work together with curriculum experts in an effort to bridge the gap between mainstream environmental curriculum and traditional environmental knowledge. The assumption is that environmental awareness is not something new to indigenous people, as they have succeeded by using their knowledge to protect the environment. Therefore, integrating indigenous knowledge into mainstream education would give indigenous people power to continue protecting their environment.

5. PAYMENT FOR PARTICIPATION

No financial remuneration is involved for participating in this investigative study

6. CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law.

Confidentiality will be maintained by means of use of pseudonyms when I refer to you in the thesis. The name of your school will not be disclosed.

The data will be kept in my private computer and in memory sticks which is only accessed by me. These will be located in a private room which is not shared with other students. The interviews will be transcribed immediately. The analysis of transcriptions and data obtained in the fieldwork will take place simultaneously as the fieldwork is being done. The development of a coding system will enable the data to be searched for regularities and patterns as well as for topics covered by the collected data. In the thesis some direct quotations from the interview might be written but I will ask for permission from you to use the quotations.

The information could be released to my supervisor should the need arises. He is fully aware of the University regulations concerning the protection of participant confidentiality. The information could be released only if I experience problems in analyzing the data. The information would not be released to anyone else other than my supervisor.

You have a right to review the tapes and we will have to negotiate on what you would like to be edited. I will be the only one with access to the tapes and they will be erased as soon as the research project is completed. The outputs of the research project will be a thesis.

7. PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so. Should I feel that your cooperation is not adequate and compromises the data collection process, I will terminate your participation.

8. IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns about the research, please feel free to contact myself Elieser Sheya at Stellenbosch University, Faculty of Education, Department of Curriculum Studies
Email: 16580516@sun.ac.za
Tel: +264833988858 (SA) or +264812517365 (Nam)
Supervisor: Prof LL Le Grange at llg@sun.ac.za

9. RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact Ms Maléne Fouché [mfouche@sun.ac.za; 021 808 4622] at the Division for Research Development

---

SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE

The information above was described to me by Elieser Sheya in English and Oshiwambo and I am in command of this languages or it was satisfactorily translated to me. I was given the opportunity to ask questions and these questions were answered to my satisfaction.

I hereby consent voluntarily to participate in this study. I have been given a copy of this form.

_____

Name of Subject/Participant

_____

Name of Legal Representative (if applicable)

_____   _____

Signature of Subject/Participant or Legal Representative   Date

| **SIGNATURE OF INVESTIGATOR** |

I declare that I explained the information given in this document to _____ [*name of the subject/participant]* and/or [his/her] representative _____ [*name of the representative]. [H*e/she] was encouraged and given ample time to ask me any questions. This conversation was conducted in [**English/*Oshiwambo*] and [*no translator was used*]

_____   _____

Signature of Investigator   Date

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Appendix E

UNIVERSITEIT·STELLENBOSCH·UNIVERSITY
jou kennisvennoot · your knowledge partner

Approval Notice
New Application

19-Aug-2013
SHEYA, Elieser

Proposal #: DESC_Sheya2013
Title: Indigenous knowledge and Environmental Education: A case study of selected schools in Namibia

Dear Mr Elieser SHEYA,

Your DESC approved **New Application** received on **08-Aug-2013**, was reviewed by members of the **Research Ethics Committee: Human Research (Humanities)** via Expedited review procedures on **16-Aug-2013** and was approved.

Please note the following information about your approved research proposal:

Proposal Approval Period: **16-Aug-2013 -15-Aug-2014**

Please take note of the general Investigator Responsibilities attached to this letter. You may commence with your research after complying fully with these guidelines.

Please remember to use your **proposal number** (DESC_Sheya2013) on any documents or correspondence with the REC concerning your research proposal

Please note that the REC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

Also note that a progress report should be submitted to the Committee before the approval period has expired if a continuation is required. The Committee will then consider the continuation of the project for a further year (if necessary).

This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki and the Guidelines for Ethical Research: Principles Structures and Processes 2004 (Department of Health). Annually a number of projects may be selected randomly for an external audit.

National Health Research Ethics Committee (NHREC) registration number REC-050411-032.

We wish you the best as you conduct your research.

If you have any questions or need further help, please contact the REC office at 0218839027.

Included Documents:
Permission letters
DESC form
Research proposal
informed consent

Sincerely,

Susara Oberholzer
REC Coordinator
Research Ethics Committee: Human Research (Humanities)

Appendix F

-REPUBLIC OF NAMIBIA

OMUSATI REGIONAL COUNCIL

DIRECTORATE OF EDUCATION

Team Work and Dedication for Quality Education

Tel: +264 65 251700
Fax: +264 65 251722

Private Bag 529
OUTAPI

05 June 2013

Enq: Mrs. Loide Shatiwa

To: The Inspector of Education: Elim Circuit
        The Principal: Peter Iilonga Combined School
   The Principal: Oshitutuma Combined School
        Omusati Region

Subject: **Permission to conduct interviews in Schools required for masters degree in education in Curriculum studies**

This letter serves to notify your good office that **Mr. Elieser Shoya** has been granted permission to conduct interview in the two identified schools. The interview to be undertaken at schools should by no means whatsoever disrupt teaching and learning.

We hope and trust this exercise will enhance quality education in the region.

Yours faithfully
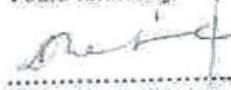
....
**Mrs. Loide Shatiwa
Acting Director**

2013 -06- 0 8

Teamwork and dedication for quality education
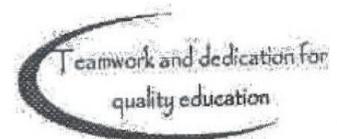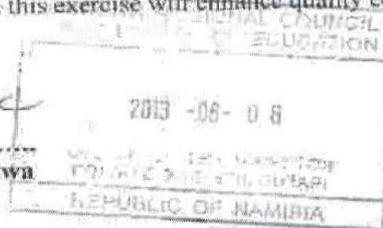
All official correspondence must be addressed to the Regional Director.

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Appendix G

REPBLIC OF NAMIBIA

MINISTRY OF EDUCTION **OMUSATIREGION** **ELIM CIRCUIT** **NUUYOMA CLUSTER** **OSHITUTUMA COMBINED SCHOOL**

Enquiry: Mrs. KM Amupolo

Cell: 0812622865

P.O Box 1275

Oshakati

26 June 2013

TO WHOM IT MAY CONCERN

SUBJECT: PERMISSION TO CONDUCT INTERVIEWS

This letter serves to inform your good office that Mr. Elieser Sheya has been granted permission to conduct interviews at Oshitutuma CS.

The interview has been taken at our school did not disrupt teaching and learning. The following teachers were interviewed:

Mr. Silas Thikameni Nuunyango a teacher for Life Science grade 8-10 and Agriculture grade 8-10. Mrs. Julia Endjambi a grade 9 life science teacher.

Thank you

Yours faithfully

Mrs. KM Amupolo

Principal

MINISTRY OF EDUCATION
THE PRINCIPAL
OSHITUTUMA COMBINED SCHOOL
2 6 JUN 2013
P O BOX 1275
0812622865
OMUSATI REGION

Republic of Namibia

Ministry of Education
Omusati Region
Petrus Nangolo Iilonga Combined School
Elim Circuit

Enq: E. Amupolo
Cel: 0812342788

P.O.Box 2641
Oshakati
26 June 2013

To: Petrus Nangolo Ilonga C/School
        The School management
        Teachers
   School secretary
        Institutional workers

Dear colleagues

Permission granted to Mr. Elieser Sheya for conduct a research

This communiqué serves to inform you that Elieser Sheya a student at the University of Stellenboseh has been granted a permission to conduct his research at this school pursued to his career. The school board don't have any objection to deny Mr Sheya this opportunity to do his research as he was granted this permission by our Regional office, as long as the activities do not disturb the normal class teaching.

We wish him all the best to complete his study.

Your sincerely
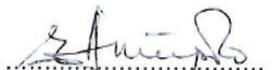
E. Amupolo (Principal)

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Appendix H

SCHOOL DEVELOPMENT PLAN

FORWARD

A school development plan is a plan, which aims to improve the school on what to be done at the school in two to three years time. The School Development Plan should include also a long term planning to improve the school

There is a no complete theory in the universe neither a perfect school development plan. Each school is unique and has its own needs and each school development plan's format differ from school to school and region to region.

What is very important is to include all the components of the plan. The plan is a continuous process, which need to be reviewed and monitored to see to it whether success or failure has been made and adjust the activities to suit the time. The SDP consist of Key area No 1,4 to 7.

The SDP need a time frame to enables all the stakeholders to study the Plan and give their input. These documents were discussed in the parents meeting on 14 November 2012 but many of the parents do not understand what it means. Parents need also to be educated on the school development plan. Finally the SDP will help the principal and school management to improve and manage the school effectively. It should be implemented and not only documented and filled.

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The school moved from its original place 500m to where it is now on November 1986. The school was established near the pool and learners might be drowned. It moved to the edge of Oshana where it is more open and not likely to be flooded.

Four prefabricated classrooms were constructed in 1988 by the Ministry of Education. However, the school remained without proper classrooms until 1997 when the government, (the capital project) constructed 2 permanent classrooms with one storeroom. Moreover, UNICEF Project established another 2 classrooms in 1998. Furthermore, in 2002 the capital project constructed another two classrooms again. Nevertheless, in 2005, four prefabricated classrooms were renovated after an outcry by the community members and School Management. The four prefabricated classrooms had been a hosting place of Mambas which were a threat to everybody at this school and the entire community at large.

The school becomes a combined school in 1999 when Grade 8 was approved due to the long distances to other schools. The school wrote its first National JSC Examination in 2002. The result was satisfactory, only 5 learners out of 21 learners failed to meet the requirement i.e. to be admitted in Grade 11. The past six years were not good in terms of National JSC Examination results of 2003, 2004, 2005, 2006, 2007 and 2008 results were very bad. The results started to improve slightly as from 2007 when the school scored 45, 16% and 2009, 65.3 % and 2010 dropped again to 36%, 2011, 48,5% and 2012, 71%.

The problem underlying in the following subjects English, Mathematics, Entrepreneurship and Oshindonga but the last subject started to pick up as from 2010.

Where are the school now?

Number of learners	: 276
Number of teachers	: 17
Grade taught	: 1 – 10
Institutional workers	: 2
School Secretary	: 1

Existing facilities

Permanent classrooms	: 11
Shed	: 1
Storerooms	: 3
Toilets (Pit latrine)	: 10

Equipments

Photocopier	**1**
Computers	**2** (one out of order)
Printers	**1**
Tape Recorder	**1 (out of order)**

Furniture's

Chairs: Every learner has a chair however 25 chairs are not in a good condition.

Desks: not enough, Grade 1 do not have desks, grade 2-3 are sharing desks expect grade 8-10.

Other equipments such as spades, rakes, wheel barrow etc. are not enough.

Academic
Where do the school want to be in 2 years time?

1. Raise high achievements for External Examination to 90%.
2. Improve the good performed for all grades.
3. Communicate with other school Regionally and Internationally through Internet to enhance quality education.
4. Implement the National Standard fully to ensure quality learning and teaching.
5. To be provide with two classrooms, Administration block, Library, Laboratory and Teachers' house.
6. Enhance effective communication in English.
7. Financial stable through strengthen the fundraising programme

How do we get there?

a. Develop a strategic plan for the 2 years.
b. Prepare the Staff Development Action Plan.
c. Involvement of parents and all stakeholders in school activities.
d. Monitor and evaluate whether everything planned is implemented.

S. W. O. T ANALYSIS YEAR 2012.

STRENGTH	WEAKNESS
1. All teachers are professionally trained and teaching their area of specialization.	1. Lack of professional ethics among some teachers.
2. Most parents attend the parents meeting and give their input in the education of their learners.	2. Parents still have a lack of understanding on education matters.
3. There is little number of drop outs and pregnancies.	3. Poor performance especially grade 10 in External Examination.
4. School building is surrounding by a strong diamond mash wire.	4. The school is in shortage of 2 classrooms, administration block, teacher's house, Laboratory and Library building.
5. There is a good relationship between school board, parents and teachers.	5. Shortage of fund because many learners do not pay School Development Fund.
6. HIV/AIDS Club is formed and the policy of HIV/AIDS is implemented.	6. Many learners are orphans and vulnerable children.
7. The school is having electricity, one computer, two printers.	7. Teachers fail to implement the learning support programme.
8. The school is in possession of a photocopier.	8. The National Standard of Education is still not well understood by some staff member.

OPPORTUNITIES

Opportunities	Threats
Staff Development Programmes to improve learner's performances.	High rate of failure in all grades.
Parents fail to come on time at the meeting.	Lack of motivation among parents.
Use SDF to purchase more books.	Financial problem hampered the school to buy resources books.
Encourage the stakeholders to involve in the school activities.	Low income from the community.

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Appendix I

The office Of the Director
Omusati Region Education Directorate
Private Bag 529
Outapi

03 June 2013

Dear Madam

Re: Permission to conduct interviews in schools required for Master of Education in Curriculum Studies

I am a teacher at Ashipala Secondary School who is currently on study leave and enrolled for a Master Degree in Curriculum Studies with the Department of Education at Stellenbosch University in South Africa. As part of my study program, I am required to carry out research study in the area of my interest. Having been a biology and Life sciences teacher for the past six (6) years I become interested in understanding the relationship between indigenous knowledge (IK) and environmental learning in schools.

The title of my study is: *Indigenous knowledge and Environmental Education: A case study of selected schools in Namibia.* The general aim of this study is to explore ways in which IK and western knowledge can work-together to support environmental learning in rural schools in the Omusati region. In order to achieve the above aim, I am therefore required to conduct interviews with traditional leaders, advisory teachers (life Sciences and Biology) and teachers (Life Sciences and Biology). I than intend to do my research at two schools in Omusati region, namely [name withheld] Combined School and [name withheld] Combined School. This is because I am familiar with many teachers at the two schools and I hope that they will not be hesitant to share their experiences with me.

I am therefore requesting your permission to enter these two schools and conduct interviews with the Life Science teachers. I will also be grateful to receive authorization from your office to conduct an interview with a Life Sciences or Biology advisory teacher. I promise to cause minimal disturbance during that process.

Yours faith fully

....