IMPROVING THE QUALITY AND RELEVANCE OF ENVIRONMENTAL LEARNING THROUGH THE USE OF A WIDER RANGE OF PREFERRED TEACHING METHODS

A case of primary schools in Mufulira District in the Copperbelt Province in Zambia

Submitted in partial fulfilment of the requirements for the Degree of

MASTERS OF EDUCATION
(Environmental Education)

At Rhodes University

BY

EVARISTO KALUMBA
609K4363

Supervisor
Professor Heila Lotz-Sisitka

January 2012

ABSTRACT

The study was conducted to investigate whether the use of a wider range of teaching methods can improve the quality of environmental learning in five Zambian primary schools. Nine teachers from five schools were involved in the preliminary stage of answering of questionnaires, interviews and focus group discussions about the use of dominant teaching methods and new teaching methods; while only four were involved in the observations of four lessons. The study is a contribution to the on-going debate on the investigation of whether teaching methods used by teachers can be one of the factors that can influence the quality of education.

Definitions of quality and educational quality in particular, are not easy to establish and no agreed upon framework for educational quality exists at present. This study reviews the debates on educational quality, and identifies three major paradigms or discourses on educational quality; and considers the human rights, social justice and capabilities approaches and educational quality frameworks as being relevant to environmental learning and education for sustainable development in the Southern African Development Community context. This, together with a review of research on teaching methods in environmental education, provides the theoretical framework for this study.

Using action research and an interpretative methodological framework, a series of research activities were undertaken to generate research data because the study was investigating the teachers' practice with a view to probe change and to analyse the findings. Nine teachers participated in the preliminary stage of answering questionnaires and focus group interviews reflecting on existing teaching methods. In stage two of this study, teachers went through a planning workshop during which they planned lessons using new preferred teaching methods. The third stage was lesson observations of planned lessons. The final stage was the reflection workshop during which the teachers shared their experiences with the use of new teaching methods. The teaching practices of teachers using the new teaching methods were the subject of further analysis.

In order to find out how the use of a wide range of teaching methods can improve quality of environmental learning in primary schools nine teachers were observed teaching lessons with new teaching methods. The Nikel and Lowe (2010) fabric of dimensions of educational quality was adapted and used to find out if teachers included dimensions of quality in the teaching process. Additional socio-cultural and structural quality dimensions, identified through a

review of southern African research, were used to find out if teachers included contextualized regional dimensions of educational quality. This was done to investigate whether the process of teaching and learning was relevant to the learners.

Teachers involved in the research reflected that when they used a wider range of teaching methods the result was that the learning opportunities for learners were enhanced and that the methods added value to their teaching, improving the quality of their teaching. The use of a wider range of teaching methods showed the presence of several indicators of dimensions of educational quality, as reflected in the quality analysis tool. Teachers indicated that the use of a wider range of teaching methods led them to include the socio-cultural dimensions such as the use of local languages and structural dimensions such as informal seating arrangements or group work that they would otherwise neglect if they used the traditional narrow range of teaching methods. A wider range of teaching methods provided learners with an enjoyable learning atmosphere during the lesson. The research also identified that this study can be taken further through broader observations, and that the educational quality dimensions tool is useful for different levels of the education system, and that it has potentially productive uses in teacher education, particularly for observations during teaching practice.

DEDICATION

This study is dedicated to my wife Betty and my children Abraham, Sarah, Mirriam, Gideon and Joseph for enduring my frequent periods of absence, movements and for partly contributing to the cost of the study.

ACKNOWLEDGEMENTS

This study would not have been possible without the support of several people that stood by my side during the M.Ed. Environmental Education course. Special thanks go to the following:

Professor Heila Lotz-Sisitka for her steadfast professional guidance during the M.Ed Environmental Education (EE) coursework and during the writing of the thesis. I would also thank her for introducing me to the Southern African Development Community Regional Environmental Education Programme (SADC REEP) bursary for the three years 2009, 2010 and 2011. I would like to further acknowledge the role she played in introducing me to the Climate Change Education Research Network. She will remain an inspiration to me.

SADC REEP: For sponsoring my tuition during 2009, 2010 and 2011 years of the M. Ed Environmental Education course.

Professor Rob O'Donoghue: For his professional guidance during the M.Ed Environmental Education Course and for his innovations such as the Sustainability Commons at the new Environmental and Sustainability Research Centre.

Mrs. M.M Mulwe: Principal and Mrs. G.K.C. Chilekwa Vice Principal of Mufulira College of Education for their financial support at the beginning of the course and for granting me permission to travel to Rhodes University for contact sessions.

Ministry of Education: For permission to travel and study away from Zambia for the period 2009 and 2010 and for partly sponsoring my studies for the last segment of the course.

Lausanne Olvitt and Ingrid Schudel: For their guidance during the two years of the M.Ed Environmental Education course and for their input on the production of the research poster.

Karen Ellery and Sashay Armstrong: For their effective electronic communication and efficient administration of the M.Ed Environmental Education course in the period 2009 and 2010.

M.Ed Environmental Education Class: For their openness and encouragement. They were a good class to work with.

Lastly but not the least, my heartfelt acknowledgement goes to my family for their ceaseless encouragement during the period of the M.Ed Environmental Education Course.

TABLE OF CONTENTS

LIST OF FIGURES, TABLES AND APPENDICES

LIST OF FIGURES:

LIST OF TABLES:

LIST OF APPENDICES:

LIST OF ACRONYMS

MOE	Ministry of education
CHANGES2	Community Health and Nutrition, Gender and Education support
EQUIP 2	Education Quality Improvement Program
QUESTT	Quality Education Services through Technology
EE	Environmental Education
ECZ	Environmental council of Zambia
GRZ	Government of the Republic of Zambia
RPC	Research Programme Consortium
EFA	Education for All
GMR	Global monitoring Report
EFA GMR	Education for all global monitoring report
SACMEQ	Southern and Eastern Africa Consortium for Monitoring Educational Quality
UNICEF	United Nations International Children's Emergency Fund
UNESCO	United Nations Educational Scientific Cultural Organisation
SADC	Southern African Development Community
ECZ	Examinations Council of Zambia
WWF TEEP	Wild World Fund Tanzania Environmental Education programme
RISDP	Regional Indicative Strategic Development Plan
CPD	Continuous Professional Development
ZESCO	Zambia Electricity Supply Corporation

CHAPTER 1
INTRODUCTION AND BACKGROUND TO THE STUDY

1.1. INTRODUCTION

The study is an investigation into improving the quality and relevance of environmental learning in a selected number of primary schools in the Mufulira district of the Copper belt province in Zambia. The focus is specifically on how the use of a wider range of preferred teaching methods contribute to educational quality improvement. The study became necessary as a result of questions asked about the current low quality of education and environmental education in Zambian primary schools. It became visible to Zambians that there was a decline in the quality of education in Zambia (SACMEQ, 2000; Carmody, 2004). The general public at present doubts the quality and value of the end product of the education system in Zambia (Kelly, 1999), and there have been calls to improve the quality of environmental learning and education in general (Nkamba & Kanyika, 1998), and to develop better understandings of how environmental education contributes to educational quality and relevance in the Southern African Development Community (SADC) (Lotz-Sisitka, 2008; Lotz-Sisitka, 2011). In this chapter I provide further background to the core concepts and context of the study as briefly introduced above, and I also provide an overview of the research questions and goals, my role and interest in the research, and provide a general overview of the study as a whole.

Conditions and facilities of the schools in the study

The five schools in the study were all Upper Basic Schools. The age group of learners in the schools were between 6 and 15 years. One school was located in a high cost urban area while the four schools were located in a low cost community. Majority of the teachers in the schools were certificate holders by qualification while a few had secondary teachers' diplomas. The schools were all built of concrete blocks and had iron and of iron and asbestos roofing materials. The four schools did not have school laboratories. The majority of learners shared text books during lessons. The schools did not have adequate teaching and learning materials. Majority of the learners sat on benches in twos. Running tap water was available in all the school ablution blocks.

1.2. CORE CONCEPT AND FOCUS 1: QUALITY EDUCATION

As indicated above, there are concerns about the quality of education in Zambia. Spoelder (2009:13) stated that Zambia's quality education level, based on cognitive test and examination scores is low in comparison to other African countries. Southern and Eastern Africa Consortium for monitoring Educational Quality (SACMEQ) research on Grade 6 reading and mathematics achievement shows very low levels of achievement of 0.9 % in reading and 0.01 % in mathematics problem solving (SACMEQ II, 2006). Learners at upper basic school level have poor competency levels in reading and mathematics as shown in Table 1.1 and Table 1.2 below. This low educational quality is manifested later in the secondary school because in most cases Grade 7 school leavers have poor writing and mathematical computational skills (Carmody, 2004). The problem extends to the graduate level, as Spoelder (2009) has stated that "a significant number of school graduates when offered a job at a company do not immediately perform effectively" (Spoelder, 2009: 65).

Table 1.1: SAQMEC II (2000) Zambia Reading Achievement Levels: Showing Percentage of Grade 6 pupils at each level

Level 1	Pre-Reading	19.9 %
Level 2	Emergent Reading	27.8 %
Level 3	Basic Reading	20.9 %
Level 4	Reading for Meaning	14.2 %
Level 5	Interpretive Reading	7.9 %
Level 6	Inferential Reading	5.6 %
Level 7	Analytical Reading	2.9 %
Level 8	Critical Reading	0.9 %

Table 1.2: SACMEQ II (2000) Zambia Math Achievement Levels; showing percentage of Grade 6 pupils at each level:

Level 1	Pre-Numeracy	16.8 %
Level 2	Emergent Numeracy	54.4 %
Level 3	Basic Numeracy	21.5 %
Level 4	Beginning Numeracy	5.0 %
Level 5	Competent Numeracy	1.8 %
Level 6	Mathematically Skilled	0.4 %

Level 7	Concrete Problem Solving	0.0 %
Level 8	Abstract Problem Solving	0.0 %

Tables 1.1 and 1.2 above show a decline in the competency levels from pre-reading to critical reading levels; and a decline in competency from pre-numeracy to abstract problem solving levels, with most Zambian Grade 6 learners being proficient only at Level 2, Emergent Numeracy; and most Zambian Grade 6 learners being proficient in Emergent and Basic Reading competence only. The table indicates that the learners have low critical thinking capacity which partly (see Section 1.3 below) results from the type of teaching methods currently being used by teachers in the primary schools in Zambia. This lack of critical thinking and abstract problem solving capacity is not in line with the general objectives of why Science is taught at primary school (Zambia Primary School Syllabus, Ministry of Education (MOE, 2000); and there seems to be a mismatch between intended curriculum as stated in documents, and curriculum outcomes, as emerging from Zambian classrooms and teaching practice. This table also shows that issues of educational quality are not confined to environmental learning, but rather that environmental learning quality may be affected and influenced by wider educational quality issues (see discussion in Section 2.1).

While these tables give a clear picture of what is expected in terms of literacy and numeracy competence, quality education is not easy to define. Tikly (2009) citing Sayed (2007) states that quality education is elusive and although the concept is frequently used, it is hardly ever clearly defined. The meaning of educational quality varies from country to country; and it has multiple meanings that reflect different ideological, social and political values. The controversy about it ranges from its definition to factors that determine it (ibid). In this study, the focus on educational quality will be in relation to the use of teaching methods only, as the study investigates the teaching and learning process.

The UNESCO Global Monitoring Report on Educational Quality (UNESCO, 2005:9) states that "the teaching and learning process is a key arena for human development and change". It further states that "it is within the teaching and learning *process dynamics of quality* where the impact of curricula is felt" (ibid, my emphasis). Quality is also felt within the processes when a teacher's method works well, amongst other factors (UNESCO, 2005). Style of teaching, referred to as 'preferred teaching methods' in this study, affects educational

quality (UNESCO, 2005). Although indirect enabling inputs such as learning time, teaching materials, assessment, feedback, incentives etc., are closely related to the quality dimension; the actual teaching and learning processes in the classroom are the most important in the transmission of knowledge, skills and values needed to improve quality education (UNESCO, 2005; Barret, Ali, Clegg, Hinostroza, & Nikel 2007). It is with this in mind that UNESCO (2005) has recommended that more attention be given to *teaching* and the *teaching process* in educational programmes focussing on quality.

A review of the literature on educational quality reveals a recent emerging debate on different education quality frameworks and models. A short overview of these is helpful to further situate the core concept of this study in relation to the research focus on teaching methods. These are three discernible approaches with many applications of these approaches visible in the literature.

A human capital approach to educational quality, which emphasises economic growth, performance and efficiency. It favours standardized assessments to assess quality (e.g. SACMEQ tests). This model of quality has influenced the Dakar Framework for Action on Education for All. It has, however, also been critiqued by Tikly and Barret (2009) citing Heneveld and Craig (1996) and Lockheed and Vespoor (1991) who state that that the concept of human capital and economic ends do not in themselves provide a framework for understanding education quality. Consequently, this paradigm has been taken up in school effectiveness approaches*. For teaching methods research, this would mean that the emphasis would be on monitoring the effectiveness of the teaching method; linked to results-based criteria.*

A human rights approach to educational quality, which puts emphasis on the role of the state in guaranteeing basic rights to education. The focus and interest of this paradigm is on rights to education, rights in education and rights for education. This approach is also prominent in the Dakar Framework for Action, and has been a key driver of the Education for All movement internationally. It is widely supported by big international organisations such as UNESCO; and has had the impact of ensuring that many more children gain access to schooling. It, in itself too, has been shown to lack an adequate mobilisation framework for quality, as it tends to emphasise access and rights*.* The framework has, however, been influential in promoting learner-centred teaching approaches such as pupil participation, learner creativity, use of local languages and democratic school structures; although these

have been difficult to implement (UNESCO, 2005). It has also been critiqued to, in some cases, be reduced to legal rights only (Robeyns, 2006). However, the framework has challenged the longstanding practice of corporal punishment (Wedgewood, 2005), and it has contributed to the transformation of schools into multi-grade initiatives in India (Blum, 2009). It has also contributed to activity based learning in state schools (Sriprakash, 2008); but these have tended to be modelled on conditions that prevail in well resourced classrooms of developed countries, and have failed to take full account of the under-resourced contexts that characterise developing country education systems (NEEP-GET, 2005). All these initiatives have spread to the schools in Zambia via various development assistance programmes, and UN interventions. One of the identified short comings of the framework is that it does not provide adequate emphasis on local socio-cultural contexts of education as it tends to emphasise the individual rights to education; yet quality education requires a response to lived realities of learners and conditions that allow learners to engage in meaning making that bridges everyday knowledge and school knowledge (Lotz-Sisitka, 2008; Vygotsky, 1978). The value of this approach is that it has ascribed schools with an insulating role for providing safe, gender-sensitive learning environments. For teaching methods research, this approach would require an analysis of the learner-centred nature of the teaching methods, and principles of inclusivity associated with the methods.

A social justice / capabilities / socio-cultural approach emphasizes redistribution, recognition, participation, meaning making, and capabilities (people's own valued beings and doings) and is influenced by works of social justice theorists such as Nancy Frazer (2008) and Sen (1999; 2009); and socio-cultural theorists such as Vygotsky (1978); Rogoff (2003); and Daniel (2008). This framework promotes curricula and pedagogies that recognize and value histories, life styles and pedagogic texts; it also supports the concept of localized curricula, but does not narrow all learning to the local only. It proposes that social arrangements such as education should permit all to participate as peers in social life. Sen's (1999; 2009) concept of capabilities has become useful as a complement to more mainstream social justice educational quality frameworks (e.g. the critical pedagogies of Henry Giroux, Michael Apple and John Fien) as it foregrounds an understanding of the range of cognitive and affective outcomes that contribute to a person's well-being (which may include critical consciousness favoured by critical theorists). There is increasing emphasis on the *capabilities approach* in education (Unterhalter, 2007; Walker, 2005;

Elliott, 2007). The framework emphasizes the opportunities individuals and communities (it recognises individuals-in-societal context) have to turn resources into functionings so that they may develop their 'valued beings and doings'; or the capabilities that they would have reason to value. Central to the framework is the idea of agency and freedom in terms of individual and community action to bring about changes that they value. The frame promotes learners' opportunities to learn how to make choices in a supportive environment free from threat or danger. The framework includes outcomes such as literacy, numeracy and basic science; which are seen to be necessary for the achievement of the freedom, but it locates the learning of these in societal contexts that matter to people; promoting situated, reflexive forms of learning and change (Lotz-Sisitka, 2008; Lotz-Sisitka, 2011). This framework for educational quality also draws on socio-cultural learning theory after Vygotsky (1978), as it emphasises the significance of culture, history and meaning making in the learning process (Daniels 2008). The SADC REEP Education for Sustainable Development (ESD) research programme on educational quality and relevance is investigating the potential of this quality framework for articulating and developing the contributions of environment and sustainability education to educational quality (Lotz-Sisitka, 2008; Lotz-Sisitka, 2011). The role of teaching methods has not been examined in the context of the SADC REEP research programme on Educational Quality and Relevance (Lotz-Sisitka, 2008; Lotz-Sisitka, 2011); a focus that I have taken up in this study. *For teaching methods research, this framework would imply the need to consider socio-cultural and contextually situated meaning making processes associated with the approach.*

Of significance to this research, is an emerging international understanding that all three orientations to educational quality have some validity, and it is the *intersections of all three* that are significant. This has been confirmed by researchers working in the EdQual research programme (Tikly & Barret, 2010) who propose a combination of the three approaches, and by researchers in the SADC REEP who are developing the third approach, located within the other two approaches as shown in Figure 1.1 below. The interest in combining these approaches is also visible in the Nikel and Lowe (2010) model of educational quality which I have adapted to frame this research into teaching methods (see Section 2.1). Of interest is the fact that Nikel and Lowe developed their model based on the Tikly and Barret analysis; and Nikel supported the SADC REEP to begin their research on Educational Quality and relevance.

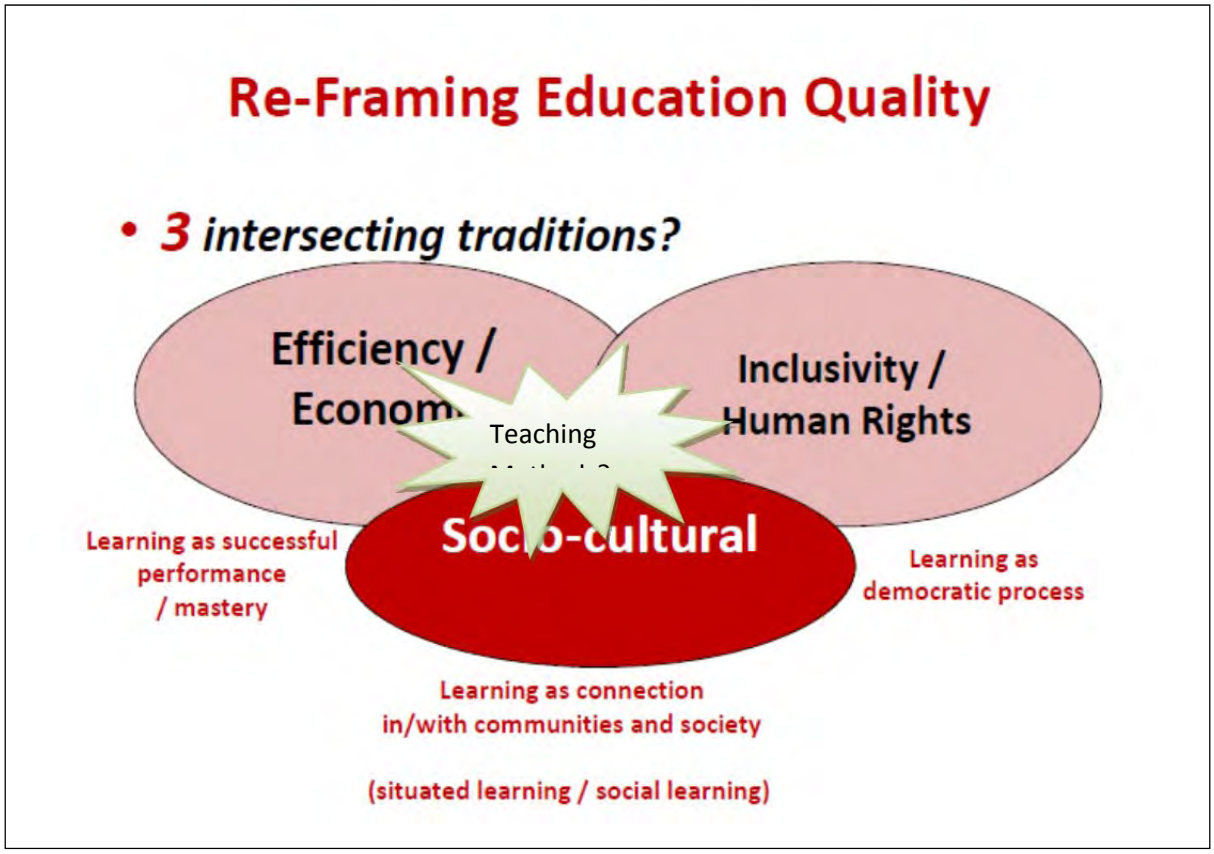


Figure 1.1: Three intersecting discourses of educational quality (Lotz-Sisitka, 2008)

This research on teaching methods and educational quality is located within this wider debate on conceptions of educational quality, and how they are actualised at the level of teaching practice.

1.3. CORE CONCEPT AND FOCUS 2: TEACHING METHODS

A second core concept and focus of this study is teaching methods. Teaching methods are perceived in different ways by different teachers locally, regionally and internationally. In some cases teachers use the terms teaching methods, teaching strategy and teaching approach to mean the same concept. In some other cases the three terms mean three different things. In this study the term teaching method means the method of instruction. This is in line with the definition by WWF Tanzania Environmental Education Programme (2001) where teaching method has been defined as a way in which the teacher decides what the learners will learn, and how the learning will be structured, supported and mediated (see Section 2.5.1 for further discussion on the meaning of teaching methods).

The focus on teaching methods in this study is linked to the insight that expanded infrastructure and physical inputs in schools by the Zambian government have not improved environmental learning (see Chapter 2). One of the aims of providing education to the citizens immediately after independence was to provide human resource to take up jobs that were created at that time (MOE, 1977:5). The government "expanded educational infrastructure to improve human capital" (Carmody, 2004: 30) to service the new state and its development plans. Little attention was paid to whether this type of education was of high or low quality, or what the critical factors were in ensuring good quality education. In most cases, the syllabi and training programmes were " only to equip learners with bookish knowledge and trades tailored to satisfy the jobs such as in mining, fitting, motor vehicle technician" (Carmody, 2004: 42; Kelly, 1999). This type of education has come to be seen as inadequate because it is either rhetorical or simply technical (Carmody, 2004: xvi; UNESCO, 2005). The primarily human capital-centred approach to education adopted by the state, promoted a very limited range of teaching methods, and an associated limited set of skills, which, as can be seen from the SAQMEC II scores in Table 1.1 and 1.2 above, are basic, and narrow, and of a lower standard than expected in contemporary society. Expanding teaching methods within an expanded notion of educational quality (not one centred on the human capital framework only) can potentially broaden educational quality, as discussed in Section 1.2 above. This is the core interest of this study.

Realisation that teaching methods were linked to the results of education, the 1977 Education Reforms in Zambia recommended changes in content, methods and organization of the curriculum (MOE, 1977:7). As mentioned above, these were narrowly constituted and have had little effect. The 1977 education reforms have therefore created a research space for this study. As argued by Sen (1999), it is not schooling that improves cognitive development of the learner and educational quality and quality of life of the learner; but rather, *it is cognitive development that adds value to learning*. This foregrounds the process of cognitive development as being important, which in turn focuses attention on the teaching and learning process, argued to be central to the achievement of quality by UNESCO (2005). This historical and theoretical background provides further justification for a focus on teaching methods in this study.

Tikly (2006) in a review of education quality identified that through Education for All expansion, and over-emphasis on the human capital model of quality; expanding inputs of

educational quality were done at the expense of cognitive development and teaching and learning processes (Camody, 1999: 45). Despite expanding infrastructure in primary schools the competency levels have continued to decline, as shown in the SAQMEC table. Orr (2004) confirms this central *problematique* in educational thinking when he wrote about the problem of education. He argues that although the frameworks adopted are human capital based, the cognitive domain of the learner is not developed and therefore the learner does not find learning valuable. The learners' capabilities are not developed (Sen, 1999; 2009; Elliott, 2007) and as such Elliot (2007) argues that human capital approaches should be *extended* through the capabilities approach. The evidence that inputs alone cannot improve educational quality makes this study very important.

Teaching methods have become important in recent research because they have everything to do with enhancing cognitive development, curriculum and transmission of knowledge and skills (Johannesen, 2006; Rickinson, 2006). Writing from the field of environmental education, Rickinson (2006) states that learning has been neglected in a literal sense in that there have been few empirical or theoretical studies that have focussed primarily and centrally on this issue in environmental education. Tikly (2006) and the EdQual research programme researchers (Tikly & Barrett; 2007; Nikel & Lowe, 2010) focussing on educational quality issues in low income countries such as Zambia, argued that greater attention should be given to teaching and learning in educational quality interventions; as these areas have been sorely neglected as donors and governments have concentrated on inputs and inclusivity issues at the expense of learning issues. This is especially true in the context of an African socio-cultural / capabilities oriented perspective and approach to educational quality; which has been almost totally neglected, which is why the SADC REEP have launched a research programme on the role of environmental education in enhancing educational quality and relevance (Lotz-Sisitka, 2008; SADC REEP 2011) to which this study will contribute.

1.4. MY ROLE AND INTEREST IN THE STUDY

I work as a teacher educator responsible for environmental education and other courses in Mufulira College in the Copperbelt Province in Zambia. I have specific responsibility for teaching the Primary Teachers Diploma by Distance Learning (PTDDL) environmental education module (Module 5 of PTDDL), and have been involved in the curriculum

development of this programme for a number of years. I conducted a survey in 2005 to establish whether teachers were able to implement what was taught in this module. This survey revealed that 60% of the primary school teachers did not know how to integrate environmental issues into the core subjects. This pedagogic deficiency in the teaching and learning process had something to do with the manner in which teachers plan, develop and use teaching methods in their lessons, as has been reported by other researchers such as Ketlhoilwe (2004). I am particularly interested in the "how part" of teachers practice; and whether an emphasis on teaching methods can improve the process and quality of environmental learning in the primary schools where the teachers coming from the PTDDL course work. A related area of interest is whether this focus can bridge the gap between teacher pedagogic practices in the primary schools and the pedagogic practices of college lecturers, as Moose (2009) found that there were substantive 'disjunctures' between the pedagogic practice of teachers in the schools, and the pedagogic practices of lecturers in colleges. His study also focussed on the PTDDL course, and the environmental education module.

Issues of teaching and learning, and the translation of pedagogical knowledge from teacher education institution to classroom are rarely investigated in Zambia (I could find no direct literature on this topic in the Zambian context, except for the study conducted by Moose, 2009). There is inadequate research and information on how teaching methods can improve the quality of education and particularly the quality of environmental education. This gap in knowledge could be one of the reasons why Zambian education planners and policy makers continue to focus on increasing the supply of educational inputs to primary schools with a hope that it could improve educational quality, without giving additional attention to the *way in which education is practiced in classrooms.*

As a teacher educator and researcher, I have conceptualised my role in this research project as follows:

- To undertake an audit of the use of teaching methods in selected primary school classrooms; to take stock of the teachers' activities within the context of classroom teaching practice (Perrot, 1982; Barret et al., 2008).

- Examine how, if and what dimensions of quality education are applied in each of the teaching methods used (Barret et al., 2008).
- Identify and undertake a critical analysis of the various dynamics associated with educational quality and how these relate to the use of teaching methods in environmental learning contexts in the primary schools.
- Support teachers to become more aware of how their lessons reflect dimensions of quality as they teach because if teachers are not conscious of quality dimensions then it will be very difficult to achieve the quality we envisage in the primary schools (Barret et al., 2008).
- Consider the meaning of all of this for the manner in which teachers would plan, and implement the lessons (Perrot, 1982); to address existing gaps in the teacher education curriculum which could lead to improvements in teacher education practice.
- Through this, also investigate the extent to which teachers in the primary school understand the concept of integration of environmental issues into the core subjects of the primary school curriculum.
- Contribute to broader debates on educational transformation in Zambia through developing understandings of educational quality from the perspective of teaching and learning.

Although the Ministry of Education is currently working in collaboration with USAID's objective to improve the quality of education, the collaboration is not concentrating on pedagogy for improving quality of environmental learning, but on other educational reforms (Zambia Education Facts, 2007). For example, the Educational Quality Improvement Programme 2 (EQUIP 2) works on supporting the collection of information on census of statistics of schools and educational leadership training; while the Quality Educational Services Through Technology (QUESTT) programme aims at improvement of quality education through Radio Interactive Instruction (IRI) (Liswaniso, 2009). Another support programme is through Community Health and Nutrition, Gender and Education Support (CHANGES 2) which supports education through policy development, institutional management, and work place HIV/AIDS programmes. Such support does not emphasise the use of teaching methods. Most of these support programmes can be seen to be based on

expanding the education inputs, and expanding access to education paradigms of quality. While these programmes are important for improving the education system as a whole, and for development of broader access and capacity, they are not focussed on the development of the learners' knowledge, skills and values through the actual learning process. Tikly (2010). This is further supported by Barret et al. (2008, citing Hanushek 1995: 235) who argued that "there are no clear and systematic relationships between key inputs and student performance". Hanushek (1995) argued that the traditional approach to providing quality education by simply providing more inputs is frequently ineffective, as noted above.

My interest in the study is also to develop deeper understandings of teachers' level of knowledge in their teaching subjects and their level of pedagogic skills in integrating environmental issues into core subjects like mathematics and languages (Barret et al., 2007). In most cases it is the level of teachers' knowledge that determines the effectiveness with which quality can be added to the learning process. My experience as a teacher educator has shown that most of what the learner considers to be the difficult subjects has to do with the manner in which the teacher uses the teaching methods to transmit the knowledge. This is confirmed by Bernstein (1990) who explained that framing refers to the degree of control a teacher and pupil possess over the selection, organization, pacing and timing of the knowledge transmitted and received in the pedagogic relationship. It is therefore true to say that the teachers' level of knowledge becomes very important in the teaching and learning process. This study intends to probe the level of knowledge of the teacher on a topic taught and how this influences the quality of environmental learning. In this regard, Orr (2004) argues that we should not assume that whatever is the teacher's knowledge is useful knowledge to the learner. I became interested in investigating the use of a wider range of teaching methods because it is a factor that deals with transmission of knowledge and skills through pedagogic practices in a lesson (Bernstein 1990).

There are other contextual factors that are of interest to this study. They include:

- *An observed poor response of teaching practices to issues of environmental degradation:* In the schools and communities in the PTDDL and other schools, as teaching and learning processes tend not to respond to local community needs. This

phenomenon (observed more widely in Zambia and elsewhere) has led to the inclusion of environmental education into the curriculum, but teachers are struggling to teach this new curriculum area, in Zambia and elsewhere (Moose, 2009; Ketlhoilwe, 2004; NEEP-GET, 2005; Hogan 2008).

- *The lack of structures to support pedagogical innovation*: While many studies have been done on quality education, much of it has been in the area of non-pedagogical factors (as mentioned above). Little work has been done on capacity to build classroom pedagogy in relation to educational quality (Spoelder, 2009). The Policy and Operations Evaluations of Primary Education in Zambia (IOB, 2008) and Longe and Chiputa (2003) report a lack of structures to support teachers in pedagogic skills related to environmental learning. There is little done via the Ministry of Education in this area. Barret et al. (2008) argue for more initiatives to improve quality of teaching and learning through developing skills of social responsibility and stewardship to achieve curriculum goals that are beneficial to life (Barret et al. 2008; Orr, 2004; Lotz-Sisitka, 2011).
- *Mismatches between examination results and actual competence*: Good examination results at Grade 7 level are not accompanied by an equivalent competency level, but poor competencies exist in the same learners who score high examination marks (as shown in the SAQMEC II statistics in Table 1.1. and 1.2 above. This mismatch between high examination results and poor competency levels points to poor pedagogic classroom practices; hence the need to develop deeper understandings of the meaning of educational quality and its relationship to teaching practice.

1.5. RESEARCH QUESTION AND GOALS OF THE STUDY

1.5.1 The research question

As shown above, the core focus and interest areas of this study can lead to several research questions that can be asked, and if well answered through research, could potentially lead to solutions about problems of educational quality in Zambian primary schools. However, for the purpose of this study, I have defined a focussed research question, which is:

How can the quality and relevance of environmental learning in Zambian primary schools be improved through the use of a wider range of preferred teaching methods?

1.5.2. Goals of the study

To address the research question, I have defined a number of research goals, which are:

- Identify what teaching methods teachers are currently using
- Examine how and if the use of a wider range of environmental education teaching methods could provide a means of improving the quality and relevance of environmental learning in Zambian schools
- Identify the structural and socio-cultural factors that influence teachers use of a wider range of environmental education methods.

With a view to:

- Contributing to knowledge of how educational quality in primary schools in Zambia can be improved through the use of a wider range of teaching methods in environmental education (Namafe, 2008; UNESCO, 2005; Hogan, 2008; Rosenberg, 2008; Shumba, 2008) and to make teaching and learning of environmental education responsive and relevant to the environmental issues and problems in Zambia.

1.6. A BRIEF INTRODUCTION TO STUDY SITE AND SCHOOLS

1.6.1 A Brief Introduction to the PTDDL and Mufulira College of Education

Mufulira College of Education is a college where Secondary School teachers in Mathematics, Science, Home Economics, Music, Art and Physical Education are trained. The college is located in the Copperbelt Province of Zambia. The college offers full time and distance education courses. The Primary Teachers Diploma by Distance Learning (PTDDL) is one of the courses offered by distance education. PTDDL is delivered through six modules. Module 5 is an Environmental Education module. The PTDDL programme is offered to teachers who would like to upgrade their qualifications from a Primary Teachers Certificate to a Primary Teachers Diploma. The PTDDL course was offered through non-contact and contact hours, teaching practice, and examination sessions.

1.6.2 A Brief Introduction to The Environmental Issues In The Area

The Copperbelt Province where the college, PTDDL students and schools are located experiences various types of environmental issues. The common environmental issues on the Copperbelt Province include air pollution from the mining industry, water pollution, deforestation, and land pollution. The mining activities largely contribute to the air and water pollution in the area because of the discharge from copper smelting and refineries. Waste management is another common environmental issue. Deforestation is caused by poverty among many residents who rely on charcoal because they cannot afford to pay for the electrical power from the Zambia Electricity Supply Corporation (ZESCO). Unemployment on the other hand forces people to cut trees for furniture as a form of self employment. Land pollution is mainly due to mine tailings dumps and uncollected garbage by the municipality councils.

1.6.3 A Brief Introduction to the Teachers and Schools Involved In the Study

The study carried out a systematic selection of the type of teachers to participate in the research. The teachers who participated in the research were graduates of the PTDDL because they had acquired the knowledge, skills and teaching methods of environmental education module 5 of the PTDDL course. The study expected them to use the teaching methods with a view to integrate environmental issues in Mufulira district into the core teaching subjects. The study subjected the nine teachers to the analytical tool by Nikel and Lowe and the socio-cultural and structural dimensions of educational quality. The study investigated if the teachers were able to teach with a narrow range or wider range of teaching methods. The study further investigated whether the range of teaching methods used integrated the Nikel and Lowe (2010) dimensions of quality, and the socio-cultural and structural dimension of educational quality. The PTDDL graduates were more suitable research participants because they provided the conditions necessary for the study such as being teachers; they had knowledge, skills and teaching methods of environmental education. The PTDDL students had a provision that they could be observed teaching in their schools.

1.7. OVERVIEW OF THE THESIS

There are six chapters in this thesis. Each chapter is a description of a particular stage in the development and implementation of the research process.

This chapter provides an introduction to the key concepts and interests of this research, and it introduces and describes the context of the study. It explains my role and interests in the study, and provides the research questions and goals. Two key concepts are discussed in the chapter: quality education; and teaching methods. These provide the rationale for the study and its interest in teaching methods. The chapter clarifies the point that while the concept of quality education is wide and controversial the study locates its works and discussion within the confines of teaching methods and how they can be used to improve the quality and relevance of environmental learning.

Chapter 2 provides an overview of literature that has informed the study. This traces historical, current and future aspects of the research question. It outlines the historical pattern of the way in which teaching methods were used and viewed within environmental education, discussing this in relation to quality of education concepts and debates as introduced in Chapter 1. Chapter 2 further discusses the local, regional and international perspectives on the research problem; and shares the theoretical framework and model of educational quality informing the study.

Chapter 3 provides a description of the research design and methodology. It describes the different research methods that were used to generate data; as well as the data analysis process. It also provides insight into how ethical and validity issues were dealt with in the research, and describes how the data was managed and processed throughout the research process.

Chapter 4 provides a description of the process of the research; sharing findings generated from the different stages and activities of the research from the teachers' first workshop, through the field research up to the second teachers' reflection workshop. It is a presentation of what happened during the study and shares detailed insights into existing

teaching methods used by teachers; how new teaching methods were introduced, and how teachers used the new teaching methods.

Chapter 5 is a description of the evidence of the research activities and findings. The selected four lessons that were observed are described in this chapter in some detail, with emphasis on understanding how the lessons have addressed quality dimensions of education are developed and actualised in the planning, implementation and post-lesson reflections of the teachers. The analysis in this chapter draws on the adapted Nikel and Lowe (2010) model of quality dimensions (which provide the theoretical framework for the study, described in Chapter 2) to observe and interpret sources of evidence in the lessons that were observed. Analytical statements are used to provide insight into the main insights gained from this analysis process.

Chapter 6 is a short description of the recommendations related to the analytical statements. The chapter provides a short synthesis of the thesis, and concludes the study.

CHAPTER 2
EDUCATIONAL QUALITY, ENVIRONMENTAL LEARNING, AND TEACHING METHODS

2.1. INTRODUCTION

This chapter discusses literature on the use of both the existing and a new range of preferred teaching methods used by teachers and their relationship with quality of education. The chapter further discusses aspects associated with the quality of environmental education, particularly as this relates to the use of existing teaching methods. The chapter discusses the historical context of the teaching methods used by teachers at classroom level and the type of quality education yielded from it, extending the introductory perspectives provided on this topic in Sections 1.2 and 1.3. Factors associated with quality education, environmental learning and teaching methods are discussed at international, regional and local levels. This literature review reveals that while interesting new developments have taken place in pedagogical innovations (particularly in environmental education), existing 'mainstream' teaching methods have not added value to environmental learning and to general education (Orr, 2004; Kelly, 1999).

As indicated in Chapter 1, it is this inability of the past and modern systems of education to bring about quality environmental learning that has paved the way to this study. This is discussed in more depth in this chapter. The chapter concludes with the assertion that "use of teaching methods affects the quality of environmental learning and education in general" (EFA, GMR, 1993:37); as also discussed in Section 1.2; and proposes a theoretical framework, adapted from one developed out of the international EdQual research programme by Nikel and Lowe (2010) to guide this research. The model of Nikel and Lowe (2010) is adapted through analysis of southern African Environmental Education research focussing on quality and relevance.

2.2. CONTEXTUAL AND HISTORICAL PERSPECTIVES ON TEACHING METHODS

2.2.1 Broad Historical Context of Teaching Methods

There are many factors that can determine the quality of education and environmental learning at any given place. This makes the concept of quality education elusive (Tikly 2006),

as indicated in Section 1.2. As indicated in Chapter 1, despite government efforts to improve educational quality through expansion of access, infrastructure and educational materials there is a steady decline in the achievement levels of learners in reading and mathematics in the primary schools in Zambia (SACMEC (II) 2006); and the types of skills and competencies being development are basic and narrow. Nkamba and Kanyika (1998) commented on this issue a few years ago, (citing Williams, 1993) in a British Overseas Development Assistance (ODA) project conducted by the University of Reading which looked at reading levels in a sample of Zambian schools in both English and selected Zambian languages such as Cinyanja, at Grade 3, 4 and 6. The study indicated that on average, pupils could not read texts two levels below their own grade level. This is in line with Kelly's (1999) explanation which states that:

> Despite the Zambian government efforts to expand access and other enabling inputs into primary schools the curriculum and pedagogy still remains colonial and irrelevant because it insists on attainment and income. The Zambian population still doubt the relevance of the education system which leaves the school leavers at primary schools poverty stricken (Kelly, 1999: 148-149).

Kelly (1999:148) further expanded on the dominance of rote learning and traditional teacher-centred teaching methods in primary schools in what he described as a context of "obsolescence and irrelevance" in relation to Zambia's educational content and teaching methods. His primary point is that teaching methods as a mode of knowledge transmission affects the quality of education. As indicated in Section 1.2 there is an increased interest in this issue amongst international researchers concerned with educational quality issues, including UNESCO (2005) who have recently put forward an argument for centering educational quality research and debates more on the role of the teacher; a finding that was confirmed by the EdQual research project working in a number of low income countries (Tikly, 2010).

In some ways, it is interesting that this focus has been so neglected in educational quality research, because whatever the teacher does to teach or mediate concepts, skills and values to learners involves use of teaching methods. Ketlhoilwe (2008) explains this problem as a problem of 'normalisation' in which teachers 'normalise' new approaches into old, taken for granted practices of teaching, and when things are 'taken for granted' they tend to attract less attention. It seems obvious, and this has indeed received a lot of international research

attention, that for learning to take place there should be an effective means of transmitting and/or co-constructing knowledge between the teacher and the learner. Studies on mediation e.g. Vygotky's (1987) work on the word-meaning unit has drawn a lot of attention to the process of interaction between teacher and learner, although it still appears to be poorly understood, particularly in countries that have been dominated by other forms of thinking about education (e.g. human capital approaches to educational quality).

Teaching methods play a very important role in the learning process, as they are important mediation tools (Daniels, 2008). The type of learning that takes place in a learning situation greatly depends on the manner and type of teaching method a teacher employs to mediate concepts and skills. Leach and Moon (2008) argue that if the teaching method is poor the type of learning would equally be poor. In the past the perspective held by most educationists and teachers was that the amount of knowledge a person possessed was equivalent to his /her intelligence. This viewpoint though still upheld by some teachers, has been widely refuted, including by environmental education researcher David Orr (2004) who has said that although common wisdom believes that all education is good and that the more one has, the better, this assertion does not hold complete truth because a large number of degree-holders are ecologically illiterate (ibid). Relating this to the research question of this study it can be said that although a large number of learners have been to school where they accumulated a lot of knowledge, they have not been fully educated. Barret (2009, citing Dryer 2001: 325) in her examination of the *relevance of education for all to nomadic pastoralists* refers to two pieces of research in which he showed that Masai boys out of school could perform higher order and more complex classifications and identifications of cattle than those in school. This example promotes the idea that pedagogical practices that invoke socio-cultural contexts, critical thinking and application of knowledge, need to be considered in educational quality discussions on teaching methods.

The dominance of transmission based methods in the majority of schools in Zambia (Kelly, 1999) reveals that teaching in the past was teacher centred and the teacher was viewed as a source of knowledge, which had to be transferred to learners using what Paolo Freire referred to as a 'banking model' of teaching (Du Toit & Squazzin, 2000). It has also been noted in some African country contexts and elsewhere, that teachers who were viewed to be sources of knowledge felt more prestigious; and forms of teaching practices that support

the 'banking model' are tied to issues of status and identity (Du Toit & Squazzin, 2000; Leach & Moon 2008).

Leach and Moon (2008: 93) argue that "This notion about the prestige attached to how knowledgeable a teacher is has for long time influenced the pedagogical practices used by teachers in many teaching and learning scenarios". They go on to say that "People who were more knowledgeable in society commanded more respect in society than those who were less knowledgeable" (ibid). This legacy of status and identity attached to knowledge led to curriculum models and patterns of pedagogical practices that privilege knowledge accumulation in learners at the expense of critical thinking. This emphasis on disciplinary knowledge which is associated with the rise of modern educational institutions (Popkewitz, 2000), led to early pedagogies being closely attached to strategies that were oriented towards adoption of subject-based content knowledge. The implication of this pedagogic legacy of knowledge accumulation and subject-based teaching strategies became the order of teaching and learning for a long time (Popkewitz, 2000); a pattern which has only recently been partially disturbed by constructivist and experiential learning theories (ibid). There is also debate as to whether constructivist and experiential learning theories ought to be a *replacement for* knowledge acquisition based pedagogies, or whether they should be *in service of* knowledge acquisition (ibid). Another implication of this knowledge pedagogy history which has dominated modern education institutions is that it has influenced the use of teaching methods in environmental learning because environmental issues have to be integrated in the core subjects where teacher-centred methods are used.

Ketlhoilwe's (2008) research showed that even though teachers were exposed to more interactive methods of teaching, they tended to 'normalise' these approaches to environmental education within their old styles of teaching.

2.2.2. Historic Context Of Teaching Methods In Environmental Education

O'Donoghue (1995: 3), in an historical review of environmental education pedagogy and method, states that "Early environmental educators believed that that teaching methods could be treated as proven models or recipes to simply use or apply in teaching". This implied that it did not matter how knowledge was transmitted provided learners accumulated it at the end of the learning process. Many teachers did not bother about the teaching method used to make learners acquire knowledge. Early teaching methods were

not evaluated to find out whether they helped individual learners in their daily life. O'Donoghue (1995: 4) argues further, "What was necessary in teaching was to use a method that would enable a learner to accumulate bookish knowledge and become aware about nature around him/her". Teachers assumed that the learner was an empty vessel who was to be informed about the environment, what was happening to it and what humans should do to care for the environment, effectively adopting the banking model of education referred to above (O'Donoghue, 1995: 5; Du Toit & Squazzin 2000). Thus, early classroom methods were dominated by project work, lecturers, show and tell. These mainly centred on the idea of changing the attitudes, values and behaviour. Early methods were of the behaviourist orientation (Wigley, 2003: 5). Learners tended to be exposed to methods and approaches that either informed them of, or encouraged them to research information about environmental issues to make them more aware. It was assumed that if better informed, they would be able to do something about the problems (O'Donoghue, 1995: 6). These methods were traditionally subject-based methods whose aim was to make the learners more aware about the environment and tended to make the facts about the environment less meaningful (O'Donoghue, 1995: 7). Such an approach to pedagogy was is described by Leach and Moon (2008: 48) who note that under such a set of assumptions, "memorization, didactic teaching and recollection of facts" is the dominant mode of pedagogy; normally confined to the classroom. O'Donoghue (2001) observed that;

> Most keen conservationists and teachers taught the environment as a world of problems and wild nature at risk. Teaching ecology and environmental education was seen as the same thing. Teachers viewed the environment simply as 'nature at risk'. (O'Donoghue, 2001: 4-6)

O'Donoghue, reflecting critically on this trend in earlier work, notes that;

> A growing concern about teaching the environment as a heap of problems became overwhelming, thereby creating a sense of action paralysis. Sometimes this was a retreat back to nature and subculture of earth-love spiritualization. (O'Donoghue, 1995: 4-6).

Although the teacher-centred methods were popular among teachers, due to the 'match' between these and their normalised classroom practices, some early environmentalists started to realize that such methods were not solving any environmental issues and problems because they did not transform the learner into a critical thinker. This led to a

period in environmental education where experiential methods were favoured, and a trajectory for environmental education named 'education *in* the environment' (Fien, 1993). This was to support learners to engage in 'holistic' educational experiences, and what O'Donoghue termed the 'earth love' movement in a 1993 critique of this trend. O'Donoghue's ongoing critique of these methods led to a better understanding of experiential learning approaches which, he argued needed to incorporate "experience (encounter); and discussion (dialogue) that challenged learners to think about (reflect on) experience" (O'Donoghue, 1995: 4).

Also commenting on the inadequacy of 'education *in* the environment' approaches, were critical environmental educators such as Fien (1993); Huckle and Sterling (1991) and Robottom (1993), who, in the early 1990's working with critical educational theory after Giroux (1989) and Freire (1970), postulated and suggested that critical thinking and analysis should underpin pedagogy; and they proposed the education *for* environment trajectory; which is still popular and influential today, as seen in the Education *for* Sustainable Development discourse of UNESCO (2005). Kyburz-Graber (1999: 416) also suggested that critical approaches to environmental learning allowed learners to explore the real world by questioning values, perceptions and opinions instead of passively absorbing environmental knowledge. This realization by some early environmentalists provided new pedagogical approaches such as action research and problem solving (Wals, 1990); action competence approaches (Jensen & Schnack, 1997); and issues based, active learning approaches (O'Donoghue, 2001). These debates are still ongoing, and researchers such as O'Donoghue et al. (2007) and Wals (2007) continue to debate situated, critical and reflexive approaches to environmental learning, most recently being discussed under the banner of 'social and situated learning theories' which also consider critical and problem solving within a wider societal context of change and capability development (Lotz-Sisitka, 2008; Lotz-Sisitka, 2011). Linking this historical pedagogic scenario with the present day pedagogical developments it could be said that that was the beginning of pedagogic awakening in environmental education, which provides a rich platform for introducing teachers to new methods, as was the case in this research (see Chapter 4 and 5).

2.3. INTERNATIONAL PERSPECTIVES ON TEACHING METHODS, ENVIRONMENTAL LEARNING AND EDUCATIONAL QUALITY

As noted in the discussion above, developments associated with new teaching and learning approaches in environmental education have been going on for more than 20 years. This has been an international movement as shown above. What is interesting to note, however, is that authors appear to have *implicit* assumptions about the relationships between the pedagogical processes they are recommending, and issues of educational quality. Few of the authors reviewed above, were *explicit* about the contribution of environmental education methods to educational quality, and it is only with hindsight, that it is possible to 'map' some of the approaches against the conceptions of educational quality that are now being put forward as described in Section 1.2. For example, it is possible to see that early show and tell, banking and knowledge transmission approaches were framed in the same 'genre' as human capital models of quality education; while experiential, critical, reflective and reflexive approaches correlate more with human rights and social justice approaches to educational quality. Similarly, there is little acknowledgement of the role of environmental education teaching and learning approaches in wider discourses on educational quality. The work of Nikel and Lowe (2010), and Barret et al. (2007) being exceptions. UNESCO (2005), in its framing of the UN Decade of Education for Sustainable Development, however, suggested that ESD should *enhance* the quality of education, but little guidance was given as to *how* this should be done.

There is, however, much potential to broaden these discussions. Ankomah et al. (2005) provide some useful orientation in this regard when they indicate that at the level of international debate and action three principles tend to be broadly shared when it comes to discussions of quality. These are firstly, the need to understand quality education in terms of firstly content and relevance. This means that quality should be understood in terms of whether what is taught is meaningful and useful to the learner and the community. Secondly, quality education should be understood in terms of whether learners have access to learning processes that provide them with survival skills. Thirdly, quality education should be understood in terms of whether individual rights of the learner are considered during the learning process (ibid). Social justice / capability quality education theorists would argue that considerations of learners' capabilities; socio-cultural contexts and well-being should be

included in the latter point (see Section 1.2). From this background it could be seen that there should be a balance in the inclusion of dimensions of quality in order to address these three principles to acquire quality education. It is for this reason that this study has used both the Nikel and Lowe (2010) model of a 'fabric of quality dimensions' (see Section 2.5.2 below) on the one hand and the Southern African socio-cultural and the structural dimensions reported on in local research (Namafe, 2008; Hogan, 2008; Rosenberg, 2008; Shumba, 2008) in observing lessons to investigate if the dimensions from these two sides are included in the teaching and learning process (see Section 2.5.4) where this approach is discussed in more detail).

As noted in Chapter 1, most of the governments, Zambia inclusive, in the low income country category have not taken seriously the development of the three principles noted above, but have only managed to understand and develop one or two principles associated with understanding quality education. This has exacerbated the quality crisis in the low income countries. Most have chosen to expand access and content at the expense of process, rights and capabilities of the learner and his/her community and society. This approach by most Sub-Sahara African countries has ended up with teacher-centred approach and human capital development models guiding educational quality. Most of the teaching and learning in the low income countries has a predominantly teacher-centred approach in their classrooms as confirmed by Tikly (2007; 2009).

Commenting on developments in environmental education in Southern Africa, O'Donoghue (1995) notes that new pedagogical approaches *were* able to broaden the experience, knowledge and skills of teachers and learners; although most research pointing to this is small scale, localised and case study based (e.g. O'Donoghue et al. 2007). From this it is, however, possible to see that as teachers began to open up to several other teaching methods in ecology and environmental education, they together with learners, started to acquire a better understanding of environmental issues, contexts, and actions. This gives more hope to the study which is looking to teachers to open up in terms of pedagogic practices as way of improving the quality of environmental learning. O'Donoghue et al. (2007); Namafe (2008); Rosenberg (2008) and others report on how project work was used hand-in hand with experiential fieldwork and local indigenous knowledge and experiments in natural and problem-solving environmental contexts in southern African contexts. This

mixture of methods, regionally and internationally used, led to emerging understandings of how environmental issues can be engaged through methods that made education more meaningful to learners. Consequently, new methods have been developed in the field of environmental education; both locally and globally.

Examples of such methods included issue-based, cross-curricula themes, simulation games, action competence approaches, and environmental studies that attempted to make environmental facts more meaningful. O'Donoghue explains that "This attempted to make the methods to move beyond the subject based information into meaningful life-world environmental concerns" (O'Donoghue, 1995: 7). The departure from subject-based classroom methods was aimed at improving the quality of education delivered to the learners. It was observed that making the learners more aware about the environment without associated action competence neither benefitted the learners nor the environment (Jensen & Schnack 1997). This international work has triggered a growing concern about the type and range of methods used by teachers.

Today environmental educators are interested in pedagogical approaches that promote transformative learning. This is described as learning that gives a learner lifelong training about and for the issues of environment (Eaves, et al. 2006; WWF TEEP, 2001). Experiential, enquiry based, reflective and affective type of teaching and learning are being widely promoted in environmental curricular today. Such learning processes are also being promoted through the UN Decade of Education for Sustainable Development as shown in a recent publication on ESD Learning Processes by Tilbury (2011) which favours processes of active and participatory learning; processes of collaboration and dialogue; processes which engage the whole system, and processes that involve asking critical questions, clarifying values, envisioning positive futures, thinking systemically, and which explore the dialectic between tradition and innovation.

Eaves (2006) suggested that the methods to be used in environmental learning should make the learner act for the environment in the context of societal issues and for himself/herself as an individual. Her perspective supports others who support the notion that action competence should be promoted in environmental learning (Jensen & Schnack, 1997; Simovska, 2008; Silo, 2009). Transformative learning and action competence further

promotes learning that does not only change behaviour of the learner without making him understand, but makes the learner become a person who can democratically make decisions about the environment and life (Eaves, 2006). This is in line with Barret (2007) who argues for value based educational quality, and who states that learning should empower learners to realize their human rights and also extend capabilities of individual learners in their societal context (Sen, 1999). This assertion is especially applicable to the learners in the low income countries where issues of poverty reduction and quality of life remain problematic (Lotz-Sisitka, 2011). However, all teachers in both high income and low income countries should explore the issue of using a wider range of teaching methods to find out the extent to which this can improve the quality of environmental learning and life style, as argued by Tilbury (2011).

In this regard, UNESCO's Education for All Global Monitoring Report states that "Many commonly used teaching styles do not serve children well: they are often too rigid and rely heavily on rote learning, placing students in a passive role" (UNESCO, 2005: 3). Research by UNESCO's Education for All monitoring team also indicated that pedagogical styles used by teachers in most developing countries are rigid, passive and of the rote learning type and do not serve children well (UNESCO, 2004). One can therefore legitimately ask the question as to how teacher education colleges are inducting teachers into teaching practices and methods (Brodt et al., 2002).

2.4. REGIONAL AND ZAMBIAN PERSPECTIVES ON TEACHING METHODS, ENVIRONMENTAL LEARNING AND EDUCATIONAL QUALITY

Although education is deemed to be the hope of the learners in schools of the low income countries of Sub-Saharan Africa, research in Southern Africa indicates that education has not been responsive to socio-ecological challenges (Lotz-Sisitka, Olvitt, Gumede & Pesanayi, 2006). Researchers in Southern Africa have cited pedagogy as one of the factors that has affected quality of education. Consequently there has been a recent engagement with this issue amongst researchers, and Southern African researchers in environmental education are now emphasizing educational pedagogy, problem solving, participation, dialogue, localized curriculum, pedagogies related to life and environment, and contexualization of curriculum as important features of educational quality that needs to be seriously

addressed. They have, in the process, also noted that a poor understanding of pedagogy (Nsubunga, 2008; Rosenberg, 2008), poverty, and inadequate linking with community potential for supporting learning (Namafe, 2008; Hogan, 2008; Rosenberg, 2008; Ketlhoilwe, 2008a & b) were issues that affected the quality of education.

Some primary school teachers seem to be dedicated to teaching and learning but at the same time show some degree of ignorance on using expanded teaching methods. Teachers in primary schools use a limited number of teaching methods in teaching environmental education (Brody et al., 2002; O'Donoghue, 2007). There is a direct relationship between teaching methodologies in environmental education and quality of education in colleges and schools (Rosenberg, O'Donoghue, Olvitt, 2007). The research conducted in Southern Africa shows that a greater number of teachers still use a limited number of teaching methods. This was found to be the case in Zambia and Tanzania too (WWF TEEP, 2001). As mentioned in the SADC regional ESD consultation process involving over 600 educators from across the 14 countries, there was concern that the current ESD practices in schools were not really contributing to the enhancement of viable development strategies or to meaningful poverty alleviation and improved quality of life (Lotz-Sisitka et al., 2006). This is one reason for introducing a focus on practical action into ESD discussions in Southern Africa which was meant to promote teachers' ethics towards practical work. The challenge to this proposed practical action in ESD is that there was very little guidance provided in terms of how this should be done.

The picture of pedagogy in Zambia is not different from the rest of Southern African countries. Efforts have been made to diversify the schooling system with some success. Nevertheless the education system continues to be heavily academic, bookish and cognitive in orientation (Carmody, 2004: xvi); which is not to say that such knowledge is not important; it is rather to say that a wider range of approaches is necessary. Teaching methods that are used by teachers at present do not fulfil the philosophy of the Ministry of Education which wants the learner to be centre of the learning process and that the learner becomes actively involved in developing his or her intellectual qualities (Zambia. MOE, 1996). It has been very difficult to attain these philosophical goals of the ministry of education because the use of teaching methods has not been given the attention it deserves in the development of the learner in Zambia and other low income countries.

The research undertaken by the SADC consultative process in Zambia revealed similar problems (Lupele, 2006). In this country-based consultation, it was noted that teachers in Zambia tend to use teaching methods that are teacher-centred and that promote rote learning; a finding that has been confirmed by Moose (2009). The majority of teachers in Zambia also rely on methods that are subject based. They are mainly aimed at making learners more aware about the environment. Like in many Southern African countries such methods do not adequately respond to, or prepare learners for responding to the environmental issues and problems. Teachers in Zambia need to adopt the transformative methods; as are being argued in the localised curriculum which has recently been introduced into Zambia (2005). However, recent research by Sinyama (2011) which observed how teachers were interpreting this brief in the context of the localised curriculum, found that teachers were not asking learners critical questions to expand their learning. Dominant teaching methods used are: Lecture method, question and answer, group work, demonstration and discussion. Less commonly used methods, as reported in the SADC consultations, and in other research (e.g. Moose, 2009) are field trips, role plays, experiments, action learning; and research and problem solving projects. Moose's research found that teachers liked using group work, question and answer, and lectures. Group work was a preferred method, but it was used, not because it facilitated social learning or certain forms of cognitive development, but because it helped with classroom management. Moose reports further that most teachers said it was easy to administer because most of the work is done by the learners while the teacher simply supervises the learners. Some teachers have abused the group work teaching method because when they give a task to groups of learners they walk out to do other things and only return to hear the learners present their findings (Moose, 2009).

The ESD consultation process in Southern Africa recommended that participation in learning introduces a range of associated changes to educational practice, such as inquiry based methods, critical learning opportunities through debates, and group work and opportunities for experiential learning (Lotz-Sisitka et al., 2006). This recommendation applies to Zambia as well because Zambia is affected by the same conditions faced by other countries in Southern Africa.

Many teachers in Zambia think that group work is a good example of participatory method. But the participatory methodology is in many cases misunderstood by many curriculum

developers and teachers in Zambia and the whole region. The misunderstanding comes about when teachers begin to think that participation means discussing in groups; as confirmed by the Moose's (2009) research cited above. There is a narrow scope of interpreting the meaning of the concept. This is supported by the distinction made by the SADC ESD consultation report on 'ESD Practices' which suggests that there is merit in distinguishing between politics of participation, where everyone is represented appropriately so that they are able to voice their views on the situation. Authors of the report state that this view of participation is widely held, and manifests in learners voicing their feelings about a certain topical issue while not necessarily learning anything new (Lotz-Sisitka et al., 2006). The other type of participation they discuss, is 'educational participation', where the challenge and the skills of a 'knowledgeable other' are essential for scaffolding learning and providing orientation and support to the learning process; as argued by Vygotsky in his theory of Zone of Proximal Development. The later type of participation is substantiated by Datta (1984: 113) and Leach and Moon (2008:74) when they stated that group work when effectively used makes a learner in the group contribute to collective and shared learning. The perspective of looking at politics of participation as being equivalent to educational aspects of participation appears to be entrenched in Southern African ESD practice (Lotz-Sisitka et al., 2006); and will need to be engaged with in any study on methods and educational quality.

2.5. THEORETICAL FRAMEWORK

2.5.1 A Shift towards More Open Ended, Situational Methods

Sections 1.2 and 1.3, and Sections 2.2 and 2.3 above, have pointed towards the shifts in thinking and knowledge that have been taking place in theorising both concepts of quality, and theories of pedagogy and method. They have also highlighted the fact that definition of quality education is not a settled matter. While this may be so, and one can agree with Johannessen (2006) that it is futile to search for a universal definition of quality of education; it is also clear that there is an emerging view that quality education in schools or other forms of organized learning should facilitate the acquisition of knowledge, skills, and attitudes that have intrinsic value and also help in addressing important human goals (GMR, 2005); placing a new emphasis on the situated and value-laden nature of knowledge,

learning and its relationship to society and societal change; with associated implications for pedagogy, and teaching methods (Tilbury, 2011).

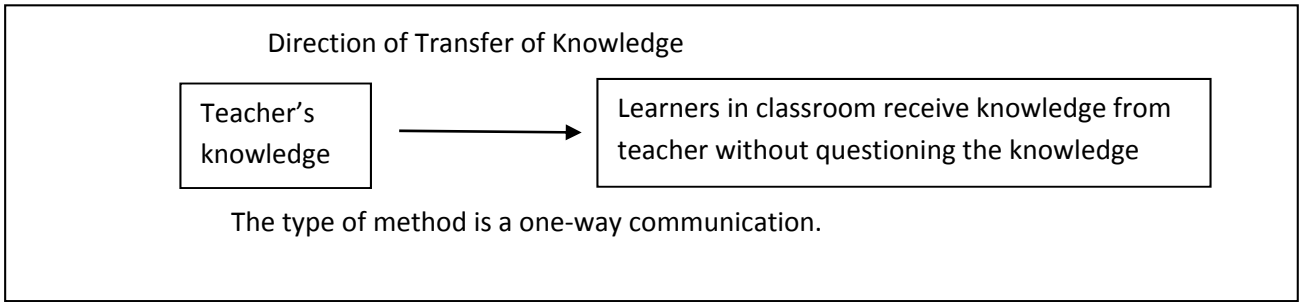
Writing more than 30 years ago, Obanya (1980) proved in his research that during teaching the concepts and skills to be acquired by the learner have to be communicated to him/her; and that if the teaching methods are not effective the learning process is of low quality. O'Donoghue's research (1995; 2007) has shown that over time, educational interactions have shifted from being predominantly communication-driven as indicated in Figure 2.1 (which focuses mainly on knowledge transfer) below to becoming more situational, as indicated in Figure 2.2 (which proposes giving more attention to culture, history, reflexivity, active approaches, dialogue and reflection in learning knowledge, values, skills and action competence). That means the way the wide range of teaching methods are being used is more educational and agency-centred rather than communication driven in order to mediate learning beyond formal school settings (O'Donoghue, 2007).

These trends correspond with wider trends towards competency based approaches to education, discussed by Bernstein (2000) who distinguishes between performance based and competency based curriculum models. Barret et al. (2007) note that the introduction of life skills related curricula (including curricula that reflects environmental learning interests) have brought about a pedagogic shift towards competence pedagogies. They state further that competence pedagogies correspond to learner-centred teaching. This is because competence approaches are associated with the constructivist view of learning through which learners are seen to be active in constructing meaning. Barret et al., (2007) agreed with Bernstein (2000: 43) who stated that:

> The underlying assumption of competence pedagogies is governed by aspects of universal democracy of acquisition which means that learners of all abilities, social, racial, and ethnic groups and genders are inherently competent and hence able to achieve their learning goals. This assumption seeks to promote equity, social justice and inclusion.

Within this trend framework, particularly when seen in the light of the broader views of educational quality that have developed in parallel (see Section 1.2), or in interaction with these emerging views on pedagogy and learning, it is necessary to plan our training schedules by shifting from the teacher-centred methodologies to more open ended methodologies in teaching environmental education. Colleges of Education should

emphasize a shift from the top-down, closed-ended to the open ended types of teaching; as recommended by O'Donoghue (1995; 2007) and other scholars, including the almost 600 people consulted in the SADC REEP ESD practices research (Lotz-Sisitka et al., 2006). Participatory and active learning approaches should be encouraged in colleges of education and in schools; but these should not *replace* an interest in knowledge, but should *enhance* the learning of knowledge, skills and values.



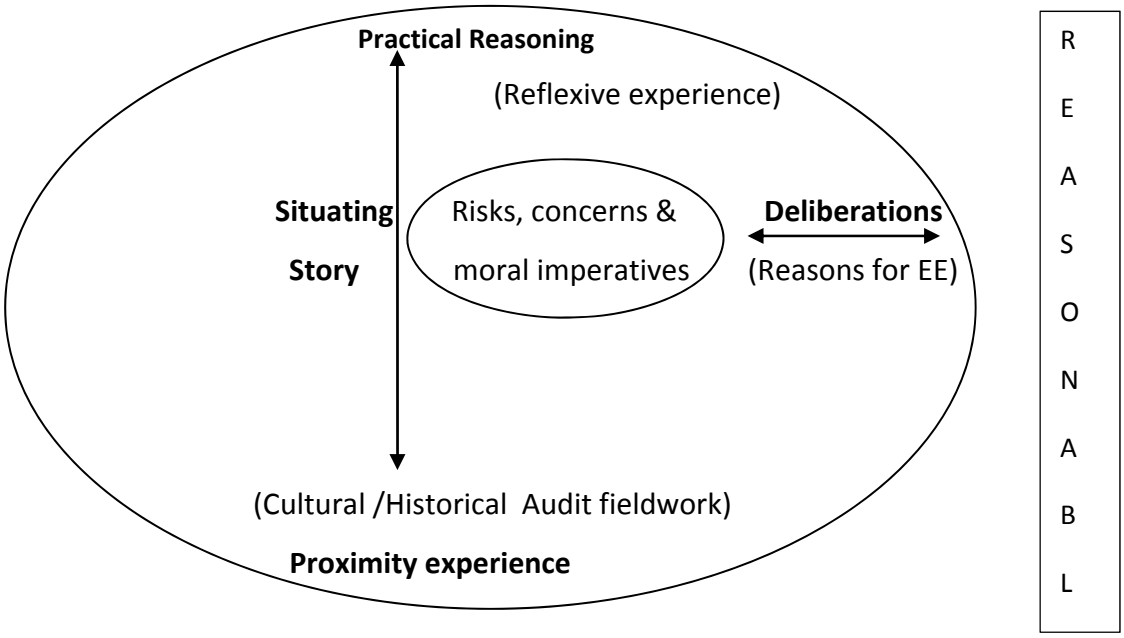


Figure 2.2: An open-ended process of deliberation towards finding reasonable solutions (adapted from O'Donoghue, 2007)

Open-ended teaching methods of teaching are in agreement with the Sen's (1999) proposed classroom provision of freedom to establish valuable beings and doings through reasoned practice; and his argument that cognitive development is necessary for learning; promotion of individual learners' capabilities in community and societal context; and also to develop action competence, and reflexive abilities amongst learners.

In their work on methods in environmental education, Rosenberg, O'Donoghue and Olvitt (2007) group the more open-ended methods into four broad categories namely;

- Experiential methods
- Investigative methods
- Learning by doing methods
- Deliberative methods

All other methods that do not appear in Table 1 still can be grouped in the above categories (Rosenberg, O'Donoghue & Olvitt, 2007); if used within the broader orientation of situated, reflexive learning, as proposed by O'Donoghue and communicated in Figure 2.2 above. In this study, I drew on this framework for methods to investigate the current teaching methods in use by teachers, and to introduce them to a wider range of teaching methods. Castle, (1956) argued that "the challenge with the use of any type of teaching method is how to make the learner become a critical thinker" (Castle,1956: 85); which in some ways provides the pre-history for these more sophisticated discussions on method, as presented in Figure 2.2.

2.5.2 A 'Fabric' Model of Educational Quality

I have already said a lot about educational quality, and teaching methods in preceding sections, which confirms that educational quality is not an easy concept to understand because it has many different meanings (Barret et al., 2006). Nikel and Lowe (2010), following on Barret et al.,'s (2006) literature review, undertook an analytical review of literature on educational quality from which they developed a multi-dimensional model which they describe as the 'fabric' of educational quality. This model articulates seven dimensions of quality education; which all need to be present to ensure educational quality. I will use this model so as to gain an understanding of the quality of environmental learning associated with use of teaching methods in this research. The seven dimensions are effectiveness, sustainability, reflexivity, relevance, responsiveness, equity, and efficiency. The model is based on a broader concept of educational quality, which intersects the three perspectives presented in Section 1.2.

Nikel and Lowe define quality as "the degree of excellence of something and that this is in turn judged or measured against other similar things" (Nikel & Lowe, 2010:2). Although the

concept of quality education carries multiple meanings and reflects different ideological and social–political values the fabric model by Nikel and Lowe encompasses almost all the features from various definitions and is supported by the definition used by UNESCO in their Education for All reporting (UNESCO, 2005). The model developed by Nikel and Lowe is shown below in Figure 2.3.

The 'fabric' multidimensional model that includes perspectives of Barret (2006) and Tikly and Barret (2009) will be used because it provides a clear 'seven dimensions of quality education framework' against which the teaching methods in this research will be monitored and reviewed for their contributions to educational quality. Through a review of Southern African literature on educational quality and relevance, two other dimensions were added to the 'seven dimensions' framework. These are socio-cultural and structural dimensions of quality, as they seemed to be prominent in Southern African authors' work on educational quality and relevance (see Section 2.5.4 below); and were less prominent in the Barret, Tikly, and Nikel and Lowe work, which was produced in the UK out of research in low income countries.

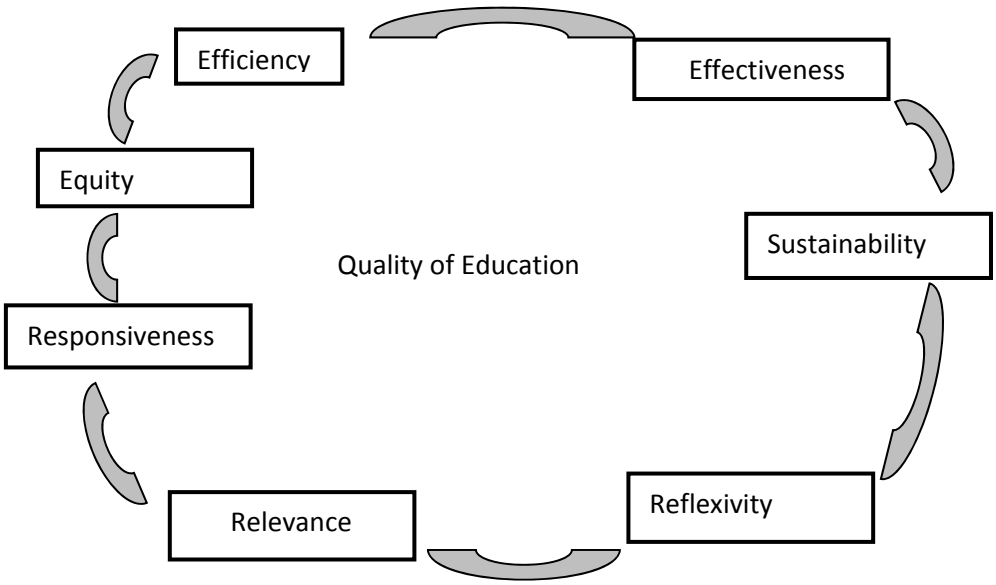


Figure 2.3: The fabric of quality in education model (Nikel & Lowe, 2010:7).

The study was interested in finding out if adding the two Southern African quality dimensions to the Nikel and Lowe quality dimensions model would improve further the

quality and relevance of environmental learning. This is supported by Ankhoma (2005) who stated that "Understanding the geographical context of quality in education, what its indicators are within the cultural milieu of particular countries, the challenges associated with implementing quality education are therefore significant".

In this regard, it is also important to take note of the perception of quality and relevance of education and environmental learning by teachers in Zambia, which has to a large extent affected the quality of education in general and that of environmental learning and use of teaching methods in particular. The perception of quality and relevance of education and that of environmental learning has, as briefly reviewed in Chapter 1, been influenced by the misconstrued colonial legacy about education. Almost all Zambians believed that quality education is one that enables a learner to excel in examinations and that which would prepare a learner for a well paying job. Unfortunately this belief was at the expense of contexualised curriculum and pedagogy (Hogan, 2008; Dadder, Baltodano & Torries, 2003: 344; Leach & Moon, 2008: 65-66) which the government of Zambia is now addressing through its localised curriculum policy to a certain extent. As shown in Sinyama's (2011) research, however, there is a need to give attention to teaching and learning methods within a localised curriculum framework if the policy is to be successfully implemented.

When viewed from the 'seven dimensions' model, it is possible to see that many of the favoured teaching methods used in Zambia and Southern Africa incorporate only one or two of the dimensions of quality education. This is attributed to the fact that the curriculum of most countries in the region including Zambia was not contexualized and therefore they gave little attention to dimensions of quality such as reflexivity; responsiveness; relevance and sustainability (SACMEQ II, 1995; UNESCO 2004: 121; Hogan, 2008). Although quality has several definitions it should be mentioned that quality of education should embrace the context of the curriculum as argued by Southern African researchers. A review of Southern African research papers addressing the question of quality in environmental education (Namafe, 2008; Hogan, 2008; Rosenberg, 2008; Ketlhoilwe, 2008a & b; Shumba et. al, 2008) indicates that all researchers refer to one or more of the seven dimensions articulated by Nikel and Lowe (2010) and Barret (2006); with emphasis on dimensions such as relevance, responsiveness, sustainability, effectiveness and also most often further additionally refer to socio-cultural/socio-ecological and structural factors influencing quality of education as

well; hence my including them in the observation framework which I developed from the Nikel and Lowe model (see Section 3.5).

As mentioned in Chapter 1, the Zambian government and its departments concentrate on expanding educational in-puts to schools and it has not recognised educational quality in its complexity to consider the question of relationship between pedagogy, teaching and learning process and quality education. Although the Zambian government recognises the importance of teaching and learning process research, there is very little such research that exists (Johannessen, 2006). Johannessen (2006) has further said that the advanced statistical methods are not able to adequately capture the complexity of teaching and learning processes that take place in the classroom. The qualitative, process oriented and observation rich framework that I am developing for observing quality in classrooms through using an expanded version of an educational quality model, may therefore be useful more widely, once it has been tested in and through this study.

2.5.3. 'Relevance' in Environmental Learning Quality Discussions

Relevance is an important dimension of quality, and as explained by Nikel and Lowe (2010) it is one of their dimensions of educational quality in their 'fabric' model. It is a characteristic of quality in education (Johannessen, 2006). However, it holds particular significance in a southern African education context. The reasoning behind the insistence on relevance is the observation that the contents and methods of education often do not take the students' experiences into account. This could be a reason why the students drop out easily from school. It is necessary to adapt contents and teaching methods to students' experiences and take their background into consideration. Johannessen (2006) further asked that if this type of pedagogy is not implemented how Africa will ever escape its dependence on the ideas and technologies of others. How will Africa prepare the next generation to innovate, to invent and create? It is useful to ensure that education performs its conservative function while on the other hand ensuring that it plays its role of being innovative so that it remains relevant to the citizens it is intended to serve (Datta, 1984; Johannessen, 2006).

Like many other African countries, Zambia has not successfully dealt with the issue of relevance at both policy and curriculum formulation level. This because the Zambian government has not stipulated the mechanism of how the policy and curriculum would

exactly ensure that relevance is achieved, implemented and sustained in primary schools and other institutions of learning such as teacher training colleges. This is confirmed by Lotz-Sisitka (2004: 38) when she wrote that one of the weaknesses of the SADC Regional Indicative Strategic Development Plan (RISDP) in achieving the Millennium Development Goals (MDG) in the completion of school for all children by 2015 is that the RISDP as a plan does not say anything about the focus and quality of education. The result is that the quality and relevance of education and environmental learning is neglected in Zambia and the whole SADC region.

Today's trend is that Zambia, like many other African countries is working toward curriculum goals that are relevant. The contemporary context for setting these curriculum goals is globalization of the economy, media and communications infrastructure, escalating warfare, democratization, and most related to this study, environmental degradation and HIV/AIDs. These are also the 'life skills' areas of curriculum referred to by Barret et al., (2006) when she comments on Bernstein's (2000) statement about shifts towards competency approaches to curriculum, mentioned earlier.

Environmental degradation has prompted the rise of Education for Sustainable Development (ESD) being promoted through the United Nations Decade of Education for Sustainable Development (UNESCO, 2005). A review of schools visited during lesson observations revealed that environmental education lacks quality because the outlook of the school should show that some work in environmental learning is being done. Most primary schools lack School Environment Management Policies. This is a sign that relevance is not attached to environmental learning contrary to claims by government that it attaches relevance and importance to curriculum and environmental education (see Chapter 5). Ballantyne, Connell, and Fien (2006) speaking on intergenerational influence through environmental education cited Jensen and Schnack (1994); Uzzel (1994); Hillcoat et al. (1995) who reported evidence of increasing paralysis of action and sense of powerlessness, especially among the young people regarding an individual's ability to effect positive environmental change, and so to attach relevance to education and environmental learning. This may be because the environmental education on offer is often too widely constituted, and lacks attention to socio-cultural and structural factors that influence agency in local context.

2.5.4 Socio-cultural and Structural Quality Dimensions of Southern Africa

The Nikel and Lowe (2010) 'fabric' model of educational quality reflects aspects such as relevance, and responsiveness, which could include a focus on socio-cultural aspects of quality, but this, is not explicit. Similarly, their model *implies* engagement with structural factors that influence quality, but does not emphasise them. As mentioned above, these are frequently noted in southern African discourse on educational quality and relevance. Failure to fully engage with these two dimensions in quality discussions could be one of the reasons why the education system and the teaching methods offered in the Southern African region is seen to be " irrelevant to the needs of the learners" (Carmody, 2004: 89), and why change in the current status quo (as described in Chapter 1) is not emerging. There is therefore a need to further investigate whether the seven dimensions of quality are representative of the range of dimensions of quality education that seem to be prominent in the Southern African context.

As mentioned above in Section 2.4.2, I have included two additional dimensions of quality education based on the Southern African context to supplement the dimensions in the Nikel and Lowe fabric of educational quality in this study (Johannesen, 2006; Datta, 1984). As mentioned by these and other authors, teaching and learning should be contexualized and learner centred if teaching and learning are to be meaningful. This means that the understanding of the geographical and socio-cultural context of quality in education, what its indicators are within the cultural milieu of particular countries, and what the challenges associated with implementing quality education are, is therefore significant (Ankomah et al., 2005). This argument is supplemented by the works of Tikly and Barret (2007) who argue that while existing models and frameworks on educational quality usefully highlight a range of factors and processes that need to be taken into account when thinking about education quality, they are insufficient for supporting the overall goal to provide a contextually relevant understanding of quality linked to the realities of 21st Century Africa in the global era.

In his paper "*Are ways of Transmitting Knowledge Universal*?" (Johannessen, 2006) engages with the debate on whether the contents of a curriculum should be adapted to the culture; or whether ways of teaching and learning are universal and are therefore transferable from the West to the South. He cites anthropological research which shows that children from

different cultures learn differently (Johannessen, 2006). From this point of view, he argues that one cannot simply transfer successful ways of teaching and learning from one continent to another, but rather that there has to be a contextualisation and adaptation process in relation to the traditional ways of teaching and learning in that country. Even within countries with a number of different tribes, teaching and learning methods may vary. An example is the research conducted in Namibia where it was concluded that the new and modern learner-centred teaching methods were imposed and influenced by Western donors and partners such that although many accepted them, they are contrary to methods of child rearing in Namibian families (Johannessen, 2006). It is for this reason that Johannessen (2006) further emphasised that teaching methods have to be understood in a cultural context. Dimmock (2000), confirms this point of view, and explains that in many cultures it is inconceivable to create a teaching and learning climate where the learner is more important than the teacher. This is patterned after the cultural family structure. It is this cultural background that has affected the teachers and lead many teachers to believe that they are the transmitters of knowledge to learners. Vygotsky (1978) also refers to the influence of culture and language on learning; and in this work he has a wider meaning of culture as being inclusive of the artefacts and mediating tools that have emerged in and through society (e.g. concepts, discourses, tools, artefacts (e.g. books) etc.) which are used to mediate learning. This interest in cultural artefacts as a basis for learning is reflected in the work of Namafe (2008) in Zambian environmental education, where he proposes a strengths model that builds educational knowledge and experience *from* local cultures, knowledge and artefacts. A similar interest in the role of indigenous knowledge and cultural artefacts in learning is shown by Hogan (2008); Ketlhoilwe (2008) and other southern African authors such as O'Donoghue and Neluvhalani (2002). Other socio-cultural issues include roles of people, norms and values of the people, activities of the teachers and learners, learning objectives and many others not included in the lists. Another critical socio-cultural issue to consider is language, and language of learning and teaching. For most children in Africa, the language of instruction differs from their home language; which has implications for cognition and for learning. In the 1977 Zambia educational reforms it was broadly agreed that learning through the medium of the English language was detrimental to educational achievement; and it was agreed that learning is best done in mother tongue (Nkimba & Kanyika, 1988). However, it was found that this strategy was impracticable in a

multi-lingual society (where more than 73 ethnic languages exist) like Zambia (MOE 1997:32). The realization was that it was not practical to use the mother tongue in multi-lingual society and the new educational policy allowed the teachers to explain concepts that might otherwise not be understood through the medium of English in one of the seven official languages, provided the majority of learners in the class could understand this vernacular language (ibid).

Datta (1984: 34) argues that education "should serve its social function by enabling learners to discover the importance of values, norms, concepts and images of approved behaviour in education". As indicated above, these values are all necessary in environmental learning. (Datta, 1984: 34-40) states further that "African countries and countries in the low income category have not been successful in providing education and teachers with teaching methods that can enable a learner to become innovative ..." and "this is what has culminated in an education system that provides rote learning in a large number of primary schools in Zambia" strengthening the case for examining a use of a wider range of preferred teaching methods as proposed in this study.

Cornbleth (1990) not only emphasises socio-cultural aspects of curriculum in her theory of curriculum contextualisation, but also structural dimensions. By structural dimensions, she refers to those conditions that shape what teachers can do, for example, availability of learning support materials can influence what a teacher can teach. As is well known, schools in low income countries generally do not have access to the same kinds of resources that allow children to acquire education of the same quality and scope as that offered in schools that are well resourced from a material and conceptual expertise point of view (such as in many expensive private schools). Poverty and lack of almost all resources affects the type of education offered in school. Southern Africa is one of the regions that is affected by the structural conditions that constrain the provision of quality education. Most common amongst these are high teacher/pupil ratio; inadequate provision of facilities and resources such as school buildings, desks, classrooms and learning support materials; inadequate support for teachers; inadequate numbers of teachers; and/or poor quality of teacher education provisioning (amongst others) (UNESCO, 2004). Other structural factors such as the high incidence of HIV/AIDS; parental poverty and/or parents' levels of literacy also affect

education. Thus, although teachers in primary schools of southern Africa and of Zambia can receive adequate minimum teacher training their performance is likely to be affected by both socio-cultural and structural dimensions of educational quality. Pretorius (1998), states that structural effects range from the effect of the Ministry of Education organization, through to school practices, classroom aspects, and even include the organization of "the sitting arrangements of the learners" (Pretorius 1998:145). He and other authors such as Avalos (2003) have produced models that show the inter-relatedness of socio-cultural and structural features of education (see Figures 2.4 and 2.5 below). These figures show that there is a relationship between the process of socialization, learner, socio-cultural and structural conditions, and quality of education. The socialization process includes the aspect of socio-culture and structures in education (Cornbleth, 1990).

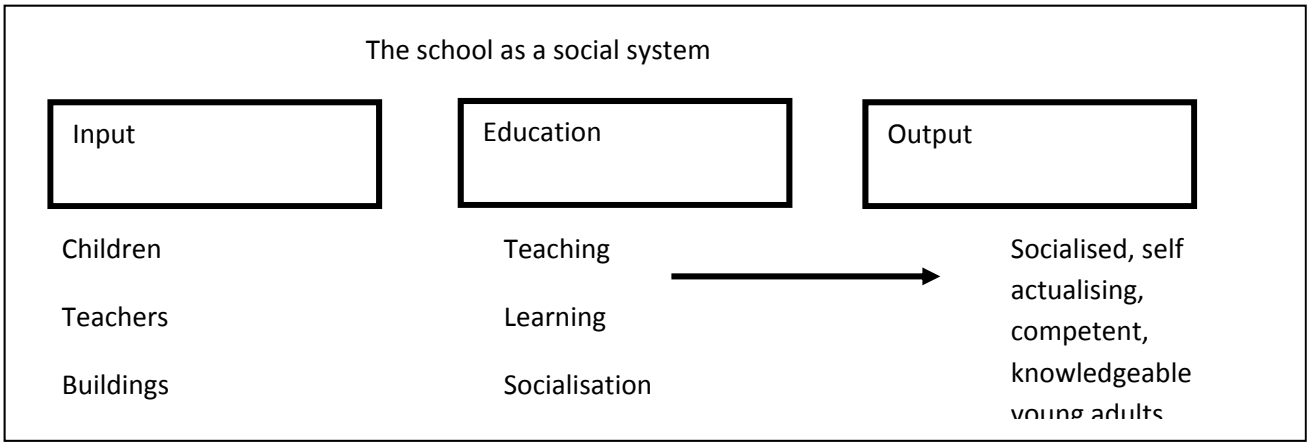


Figure 2.4. ***Socio-pedagogics*** **(adapted from Pretorius, 1998:129)**

Education goals		Controlling factors
Developing people's capabilities	←	Comprehensive cultural education system such as language, heritage.
	←	Relevant curriculum frameworks and syllabuses

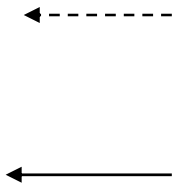
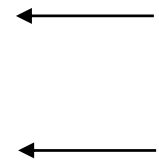
<table>
<tr><td rowspan="2">Education within cultural context</td><td rowspan="2">  </td><td>Resources in appropriate combinations (time, teaching materials, teaching and learning environment)</td></tr>
<tr><td>Meaningful and affective pedagogical interactions, relations, strategies , management</td></tr>
<tr><td>Building and constructing democracy and enabling citizen participation</td><td rowspan="2">  </td><td>Supportive and administrative and management systems in and out the school</td></tr>
<tr><td></td><td>Targeted actions and inclusive education items.</td></tr>
<tr><td>Preparing for economic and productive participation.</td><td>  </td><td>Teacher/Educator knowledge capabilities.</td></tr>
<tr><td colspan="3">Enabling policies
Teacher education
Measurement of education policies
Flexible and sufficient management
Control of quality</td></tr>
</table>

Figure 2.5.Improving quality in education: A challenging risk. Adapted from Avolas (2003:8)

While the more negative effects of structural and socio-cultural factors on education are well documented, I found less work that looks at the *potential* of using local culture in learning and improving quality, particularly in a southern African environmental learning context. Namafe (2008: 14-15) in his research on Environment and Sustainability Education in Zambia, found that some basic schools in the Western Province of Zambia had great potential in developing their environmental and sustainability curriculum on the abundance of the indigenous foods and herbs, seasonal floods, and traditional ceremonies only practiced in the Western Province of Zambia. He argued that the school can develop a localized curriculum based on development of food processing and projects with a view to make herbal medicines produced from local plants endemic to the Western Province. This is

in line with Datta's (1984) argument that education should make learners innovative. Namafe's work (2008) reflects some of the underlying perspectives promoted by Sen (1999) mentioned in Section 1.2 which asserts that learning should be focussed on extending learners as valued beings and doings. Walker (2005:104), drawing on Sen's capability approach also states that there is potential for localised curriculum work to expand human freedom, where learners can be supported to make meaningful choices from a range of possibilities, hence giving them experience of the " freedom to choose a life they have reason to value" (Walker, 2005: 104).

Similarly, Hogan (2008; 2007) argues in favour of contextualised curricula in Tanzania, where indigenous knowledge and learners' social experiences in environmental and community contexts were seen to be an asset in the curriculum development process. She argues (2007:42) that relevance should not be conflated with quality because it is a contributing factor to quality education (see also Nikel and Lowe, 2010). She, however, attributes value to this contributing factor as it is closely related to the life of the individual learner in a societal context. She argues that pedagogy should respond to culture and context (Hogan, 2007). Hogan supported the suggestion by Lotz-Sisitka (2007) that there are five dynamics of relevance as a factor in quality education; namely, context, purpose, relations, knowing and process; and that these should be considered in developing the *relevance* aspect of educational quality in environmental learning (Hogan 2007). The dynamics of educational quality and relevance are shown in the diagram below. As can be seen from this, this view of researching quality includes a focus on epistemology (ways of knowing), and *inter-epistemology* (interactions between different ways of knowing) which may, for example, include interactions between formal school knowledge or scientific concepts, and indigenous and local knowledge. It also includes both the socio-cultural and socio-ecological contextual aspects, such as those included in the Namafe (2008) study. It also focuses on purpose, values and ethics which can help with contextualisation of the education, *and* it focuses on school-community relations, which few models of educational quality do. Hogan's (2008) research confirmed the relationship that exists between these elements of quality within a *contextualised curriculum model.* She found, for example, that including indigenous knowledge in the curriculum improved school-community relationships, helped children and communities to consider the value of the education of the children differently, and this in turn affected the pedagogy and types of methods used. It also brought local

socio-cultural and socio-ecological issues to the attention of the school, thus enhancing the relevance of the education. She also reports improved learning outcomes in relation to the expected formal education curriculum requirements as a result of this focus (Hogan, 2008).

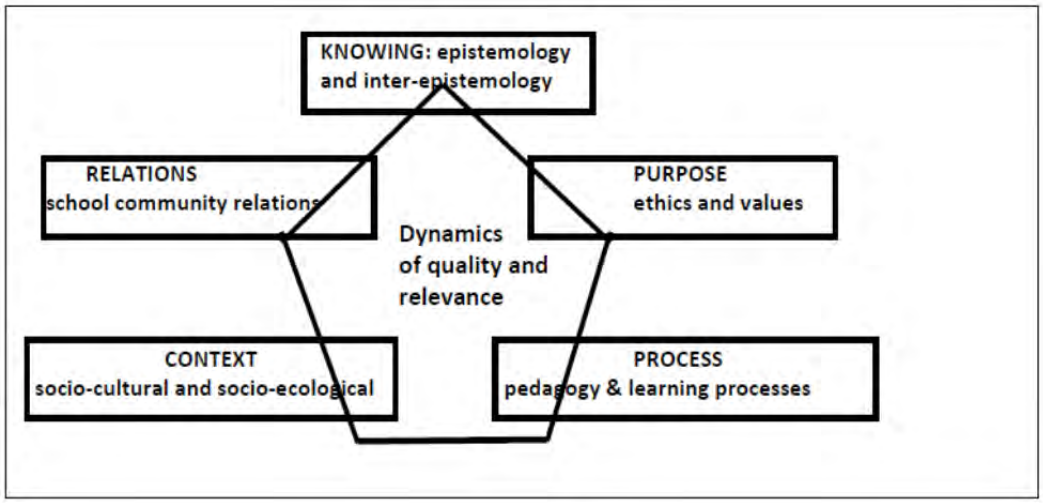


Figure 2.6. A heuristic for researching education quality and relevance (Adapted from Lotz-Sisitka 2007, cited in Hogan 2007)

2.6. CONCLUSION

As indicated in this chapter, there are a variety of ways of thinking about educational quality; and that some of these perspectives differ, depending on context and philosophical orientations to quality (as discussed in Section 1.2). As shown in this chapter, the development of teaching methods internationally, and in a regional context, has been influenced by notions of educational quality, and vice verse. In environmental education a trend towards more open-ended teaching methods was identified. It was also noted that a theoretical framework that allowed observation of a range of different quality elements; including socio-cultural and structural issues was needed to develop an understanding of whether and how new teaching methods could contribute to educational quality. The next chapter explains how this theoretical framework informed the research design, and how the research was conducted, focussing on the practice of teachers in five primary schools in Zambia.

CHAPTER 3
RESEARCH DESIGN AND METHODOLOGY

3.1. INTRODUCTION

This chapter discusses the research process and the activities that were involved in investigating the research question. The research question focused on finding out if the use of a wider range of teaching methods can improve the quality and relevance of environmental learning. The chapter further discusses the methods used in generating the research data. The chapter concludes with showing how the Nikel and Lowe (2010) model of quality (described in Section 2.4.2) and the Southern African socio-cultural and structural dimensions of quality education (described in Section 2.4.3) were used to construct an analytical framework for analysis of the quality dimensions of environmental learning lessons which resulted from the methods teachers chose to use; following a workshop in which they were introduced to a wider range of methods.

The chapter explains the qualitative aspect of the study and its interpretative orientation. It then discusses the research methods and tools that were used to generate the data. Each technique used for data generation is explained, and why the technique was chosen. The way the data was organized, interpreted and analysed is discussed. The chapter concludes its discussion with research ethics (Cohen, Manion & Morrison, 2000) and reflections on the research methods used.

3.2. RESEARCH METHODOLOGY

3.2.1 Action Research and Interpretive Approach

The research used a combination of action research (Phase 1) and interpretative methodologies (Phase 2). The two methodologies were used in this research because of the nature of the research object that was to be investigated. The nature of the research question required an action research process to engage teachers with the question of 'new preferred teaching methods' which required a planning teachers' workshop, lesson implementation; and a second reflection teachers' workshop (see discussion in Section 4.2.1; 4.3. below).

Action research involving a cycle of planning, acting and reflecting, was used because it allowed for both the "epistemology and practice parts of the investigation" (Somekh & Lewin, 2005: 89). Action research allowed the investigation of teachers' developing knowledge and practice of using new preferred methods; and their reflections on this process (Cohen et al., 2000; Yin, 2009; EdQual, 2006). In this process I was involved as a participant observer; leading the teachers' workshops, supporting the teachers to make new methods choices, and then observing their classroom practices, and engaging them in reflections. This allowed me to work with the teachers at the primary schools in the Mufulira district. The strength of the action research process was that it allowed me to engage the teachers in a process of innovation with regards to their teaching methods (Greenwood & Levin, 1998; Reason & Bradbury, 2001; Stige, 2002). Through the classroom observations in the action research process, I was also able to investigate the learning interactions, and the strategies used by learners and teachers in environmental learning. The action research process also allowed me to investigate the level of knowledge of both teachers and learners, which provided rich data for interpretation from a quality perspective in Phase 2 of the study.

The first research question focussed on the issue of existing dominant teaching methods (Cohen et al., 2000: 226) prevalent in primary schools in Zambia, particularly in Mufulira district. The second research question focussed on whether the existing dominant teaching methods were providing a wider or narrow range of teaching methods (see Section 1.3). This required interpretive engagement (using an inductive approach) with teachers during the first action research workshop; where existing methods were reviewed, and new methods were engaged with and selected for implementation in classrooms; and implementation of the lessons were reported using inductive approaches to interpretation (see Chapter 4).

The third research question focussed on whether the existing teaching methods were improving quality and relevance of environmental learning in the primary schools in Mufulira District in Zambia. This required a different form of interpretive analysis (using theory of educational quality dimensions reported on in Section 2.4) in an abductive approach (Danermark et al., 2009), reported in Chapter 5. Thus, after lesson observations the results were subjected to a process of interpretation using theory (Phase 2). In the first instance, both myself as researcher, and the teachers were able to undertake initial

reflective interpretations of the lessons as planned and implemented at their schools in relation to the new categories of teaching methods during the second teachers' workshop.

To synthesise and subject the data to a more rigorous review using the quality dimensions theoretical framework, I used an analytical tool (see Figure 3.1; and Chapter 5). In doing this, I included data from the teachers' planning, practice *and reflections.* This in-depth analysis of the data using the theoretically informed analytical tool that I developed for the study (see Chapter 5), helped me to more fully address the research question; "How can the use of a wide range of teaching methods improve quality and relevance of environmental learning in primary schools in Zambia". However, as the type of study could not be done across Zambia, or even in a widely representative set of schools, I chose to use a case study approach to gain in-depth insight into the question.

3.2.2 Case Study Approach

A case study is "the study of an instance in action" (Adelman et al., 1980: 19). It seeks to achieve depth of insight into a particular bounded phenomenon. Yin (2000: 18) states that "a case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real life context, especially when the boundaries between phenomenon and context are not clearly evident". Adelman et al. (1980) further explain that the single instance of a bounded system could be that of a child, a clique, a class, a school, a community, a teacher, or a teacher's practice. One of the strengths of this method is that it provides a unique example of real objects. It provides a methodology through which understandings can be reached of real people (teachers) and their practices and views (Yin, 2009). In this study I was able to observe cases of teachers' practice, where teachers were interacting in the real situation (the class room) with the learners by using certain teaching methods; assuming that they were offering quality and relevant education in environmental learning in the case study.

Yin (2009) states that case study method is used when the research question is dealing with a problem whose research question starts with "How can …". As reported in Chapter 1, my research question is about "How can the quality and relevance of environmental learning be improved through the use of a wide range of teaching methods?" Case studies are also used when the researcher has little control over the events he/she is investigating. In this study I had little control over the teacher and teaching and learning processes during lesson

observations. The case study method was relevant and most suitable to this research because it deals with operational links that need time to be traced instead of frequencies or incidences (Yin, 2009). Another advantage of the case study method over other methods is that it has the ability to deal with a full variety of evidence such as documents, artefacts, interviews and observations (ibid).

I investigated the practice of nine teachers who went through the real processes of participating and deliberating on methods in workshops, and who taught real lessons in classrooms. This method provides in-depth understanding of a situation happening on the ground such as the teaching methods being used during teaching and learning and their relationship with quality and relevance of education; which was the bounded 'unit of analysis' that I used in this study (Tellis, 1997:2). A total number of nine cases of teachers teaching using several methods they preferred to use in teaching were observed; however, due to the scope of the study, I only reported on and analysed four of these in depth, which were selected from the nine observed so that one of each type of teaching method was represented in the final analysis (see discussion below). The case study of the use of preferred methods and their contribution to educational quality, as presented in this thesis, involves the practice of four teachers in the Mufulira district, as mentioned in Chapter 1, as constituted within an action research workshop and lesson implementation process involving nine teachers, and nine initial observations.

3.3. DATA GENERATING TECHNIQUES

Data generation is the process of documenting or generating information from the events and activities of the research. To generate data for this study, as is the norm with case study research, several techniques were used in generating data about the research question. The different research tools used are discussed below.

3.3.1. Workshops

In this method teachers were gathered in one place with a purpose of engaging them in activities that generated information relevant to the research question. I invited nine teachers from five different schools in the Mufulira District, in Zambia who had previously completed the PTDDL module on environmental education. The teachers invited to participate in the research were those who had earlier participated in the PTDDL course and

who were based in schools that were within reach of the college. The first teachers' workshop lasted two days. The teachers were engaged in the following activities:-

Answering pre-workshop questionnaires on existing teaching methods

This part of the workshop allowed individual teachers to complete a questionnaire on teaching methods that were predominantly used in their day to day teaching in primary schools (see Appendix A). Each teacher answered the questions according to his/her own experience. Each teacher handed the completed questionnaire back to the researcher.

Engaged in focus group interviews on existing teaching methods.

This part of the workshop allowed teachers to form two focus groups. Each focus group was engaged in answering questions based on the teaching methods that teachers preferably used usually to teach (see Appendix B). Each teacher was allowed to share his/her experiences with the use of teaching methods in their teaching of environmental education.

Reading texts and books on new categories of teaching methods.

At this stage of the workshop teachers were given one hour to read through the methods section of a teachers work book focussing on environmental teaching (Rosenberg, 2009). The book contained a variety of teaching methods that were divided into four main teaching categories. The four main categories, informed by the theoretical framing of more open, deliberative and reflexive methods (reported on in Section 2.5.1) were:-

Experiential category

Investigative category

Deliberative category

Learning by doing category

Each of the four categories had a list of complementary teaching methods associated with it.

- Planning lessons based on new categories of teaching methods

In this activity the teachers were grouped into pairs and each pair was allowed to choose a category of teaching methods they preferred to use for planning lessons

and later teaching. This is an activity that allowed teachers to choose a category of teaching methods they preferred. The teachers were also asked to choose a complementary teaching method from the same category. The teachers worked on these activities on the first day of the workshop. The teachers at the workshop discussed the different formats of the lesson plans that are used in different schools and contexts and agreed that each teacher was going to use the lesson plan format that was used in the school where they taught. The teachers in pairs presented the lesson plans to the workshop participants so that the other participants could add or adjust the lesson plans before finally using them to teach. Four pairs planned lessons and presented to the workshop participants. Each pair of teachers were asked to plan another lesson so that each of the participants had a lesson planned which could be used to teach using the new categories of teaching methods (see Chapter 4). Teachers were asked to write up their lesson plans, and these were collected as documentary evidence for the research process.

- Presentations of planned lessons in pairs

This part of the workshop allowed the teachers to explain the following:-

Explain the category of teaching method and the complementary teaching method they choose from the list of categories of teaching method

The subject or learning area and topic chosen to teach

The lesson objectives

The environmental issue to be integrated in the lesson

The point during the lesson at which they will integrate the environmental issue into the learning area and process

The teaching methods used at each teaching point

The number of teaching methods used during the lesson.

Each lesson plan was checked and filed. Worksheets used by teachers were carefully filed with lesson plans for references. Lesson (field) observation notes were transcribed and carefully recorded in the field note book. This provided further evidence, which was later interpreted to give an account of teachers' preferred methods and teaching practice; and how these differed from the initial methods they were used to using (see Chapter 4).

- Drawing a lesson observation schedule for planned lesson plans

This part of the workshop allowed me to negotiate with the teachers when each teacher was able to pilot and implement the planned lesson in their schools so that I could observe the lesson. I agreed with the participants that between April and May 2010 four lessons would be observed while the other five lessons would be observed between the end of May and the end of August 2010. A schedule for lesson observations was drawn up in consultation with teachers, showing the date, name of teacher to be observed, time of teaching, learning area and name of school (teachers agreed for their original names to be used in the report), as captured in Table 3.1 below. Table 3.1 also shows the categories of methods teachers chose to work on, and which were included in the final narrative of the thesis in Chapter 4.

Table 3.1: Round 1 of lesson observations

S/N	TEACHER'S NAME	DATE	SCHOOL	TIME, PERIOD & SUBJECT	Category of Teaching Method
1	Mwansa Regina	6/4/10	Mutundu Upper Basic School	10.30 hrs	Learning by doing (included in Chapter 4)
2	Zulu Zenness	7/4/10	Mutamba Upper Basic School	10.30 hrs Mathematics	Investigative
3	Chanda Christabel	8/4/10	Mutamba Upper Basic School	09.00 hrs, Icibemba	Deliberative

Table 3.2: Round 2 of lesson observations.

S/N	TEACHER'S NAME	DATE	SCHOOL	TIME, PERIOD & SUBJECT	Category of Teaching Method
4	Sakala Ruth	2/7/10	Mine Upper Basic School	08.30 hrs	Experiential
5	Bunda Rosalyn	2/7/10	Mufulira Upper Basic School	11.30 hrs	Deliberative
6	Masusu Judith	20/7/10	Mufulira Upper Basic School	09.00 hrs	Deliberative
7	Edna Mwansa	29/7/10	Kasumba Upper Basic School	11.30 hrs	Investigative
8	Chishimba Everlyn	30/7/10	Mutundu Upper Basic School	12.00 hrs	Learning by doing
9	Tanasho Hilda	6/8/10	Mutamba Upper Basic School	10.30 hrs	Experiential

In this workshop nine teachers from five different schools were given the opportunity to participate in a workshop at which they were involved with the following activities:-

- Interviewed on existing methods as individuals

- Participated in focus group interviews
- Gave reasons why they used existing methods
- Stated the factors teachers considered when choosing a teaching method
- Used documents on new teaching methods in environmental learning
- Planned lessons on new teaching methods

Two workshops were held. In the first workshop teachers worked with the activities listed above while the second workshop was a reflective workshop. In the reflective workshop teachers made reflections on their lessons by examining the category of teaching methods used and the complementary teaching methods used. The second teachers' reflection workshop gave teachers an opportunity to reflect on method of integrating environmental issues into core subject areas by using a wider range of teaching methods. Data from the second workshop was captured using a questionnaire that compared the existing methods and the wide range of new teaching methods (see Appendix C for an example of the data generated in the second workshop).

The workshop technique was used because it:-

- Allowed teachers to discuss existing teaching methods,
- Allowed the teachers to interact with each other and share knowledge and skills on use of teaching methods,
- Allowed teachers to plan for use of new teaching methods,
- Allowed teachers to plan for lessons on new teaching methods,
- Allowed the teachers to discuss the challenges faced with teaching methods,
- Allowed teachers to discuss ways of integrating environmental issues into core subject areas, and it
- Allowed teachers to share their experiences of using new methods and reflecting on these in terms of discussions we had had on the quality and relevance of environmental learning.

3.3.2. Focus Group Interviews

A focus group interview is a form of a group interview. It differs from group interview because the reliance in the focus group interview is on the interaction among the group members and not between the researcher and the group (Cohen et al., 2000). In the focus

group the agenda that emerges from the interaction among the members of the group is the group agenda and it is a summary of the group discussion. The focus group is formed from a specifically chosen sector of the population (primary school teachers) to discuss a particular given theme (the use of teaching methods).

The focus group was used because:-

- It allowed the discussion to be oriented to teachers and use of teaching methods
- To gather feedback from teachers
- It allowed the members to share experiences from the same sector
- It allowed the researcher to observe the reactions of the group members during the discussion and how each member was able to defend his/her views (Somekh & Lewin, 2005)

Focus group was used in this research because the research was dealing with one group - teachers - who had a common work experience of teaching methods, and was aimed at one goal - the quality and relevance of education in general and environmental learning in particular. In this technique the teachers were divided into two working groups and were given the same questions to answer (see Appendix D). The answers from the focus groups were summarized and written on flip charts. The focus group was a time during which teachers shared their teaching experiences as each one of them answered the questions.

3.3.3. Semi-structured Interviews

In this technique open ended questions were asked to individual teachers before and after teaching the lesson (see Appendix E). They were also used when interviewing teachers before the workshop. This technique was used because it built some flexibility into the interaction between the researcher and the teachers that were being interviewed. Flexibility brought in by open ended questions allowed me to capture unexpected issues and information (Somekh & Lewin, 2005). The technique was used in order to allow me to incorporate, on the spot, some of the questions and issues that were not included in the questions but which emerged as being significant during the interview. Semi-structured interviews have an advantage of capturing issues and information that could not be captured by the questionnaire because the questionnaire is a form of a closed interview (Somekh & Lewin, 2005:42).

Semi-structured questions were used to probe teachers' experiences in the use of teaching methods. The questions probed teachers approach to, choice of, and use of teaching methods. In this technique the teachers answered the questions verbally. This technique was used to find out what the teachers thought about the lessons they taught. Interviews also facilitated teachers' reflective process of self and lesson evaluation in relation to the research question and dimensions of quality education. All interviews were transcribed (see Appendix F for an example of one of the interviews); and nine interviews were conducted in total.

3.3.4 Questionnaires

This is a technique that provides a way of gathering structured or unstructured information from respondents in a standardized way (Somekh & Lewin, 2005). Although the data collected by questionnaires is often numerical and can be numerically represented and ranked, the research was interested in the nature of processes and not frequency of responses.

The questionnaires were of a self completion type in order to make them cost and time effective. The nature of the questions determined that the questionnaires be anonymous because teachers were answering questions about their own classroom practice (Hart, Jickling & Kool, 1999). The questions were therefore sensitive, although it emerged later that teachers were happy for me to use their names in the study. This technique was used to enable teachers to answer the questions in written form. These questions required teachers to write in some brief statements about the teaching methods they used (see Appendix G for an example of the questionnaire used).

3.3.5. Lesson Observations

This method is a method that allows the researcher the opportunity to gather 'live' data from 'live' situations. The researcher is allowed to look at what is taking place '*in situ'* rather than getting second-hand information (Cohen et al., 2000: 305). This method was necessary for this research because it enabled me to develop knowledge of the way the teachers were using the teaching methods and the impact of the teaching methods on the quality and relevance of environmental learning during the lessons. The type of observation was unstructured observation (Somekh & Lewin, 2005) where the researcher sits at the back of

the classroom and makes notes about what he/she observes. In this study detailed lesson observation notes were made, pictures taken and video tapes recorded. I used the quality framework questions to guide some of the observations (see Appendix H for an example of some observation notes).

The method was used because:-

- It made me, as researcher, look at what was going on in the classroom directly,
- It allowed me to understand the context of the teaching and learning process,
- It made the teaching session open-ended and inductive and allowed me to see the things that otherwise might have unconsciously been missed,
- Allowed me to discover things that the teachers and learners could have freely talked about. It allowed the me to go beyond perception-based data,
- It allowed the me to access personal knowledge, and it allowed for 'Fresh' and real data which questionnaires cannot provide.

In relation to the research question the lesson observations were suitable for the research because they enabled me, as researcher, access to:-

- The physical setting and environment of the classroom where teaching and learning and teaching methods were applied,
- The human setting and organization of the people, the learners, and issues of gender,
- Classroom interactions between teacher and learners, between teaching methods and learners, informal and formal interactions, verbal and non verbal interactions, and
- The classroom resources, pedagogic styles and curricular organization; all of which were important to the research question.

In all, nine lesson observations were made. The lesson observations were made between April 2010 and the end of August 2010. This was a main data generating activity in the research. Each teacher was willing to teach a lesson in the school where he/she worked. Each teacher used the lesson plan that was planned during the first workshop. The observations took three months because this process needed negotiation with teachers and their school timetables and calendar of activities.

3.3.6. Field Notes

This technique was used to record any data that was observed in the field about the activities and research question. The field notes were written both *in situ* and away from the situation. The notes also contained the results of the observations. The field notes were written to capture information that was discovered during the observation visits.

There were instances when I visited the schools to triangulate information from teachers. During such visits to schools I also did member checking of data. It was during such visits when, for example, I discovered that the tree, that was used by the teacher who was observed first, had died and was no longer at the place where it was planted in a lesson we observed first. I looked at the lesson observation notes and used that situation to write some field notes about the lesson that was successfully implemented, but the teaching resources used did not last a long time. In this particular lesson the teaching resource being the tree that was planted did not last many months. The learning point is that teachers should not end at theoretically talk about the environment (in this case the tree that was planted) but should teach learners how they can make them last for a long time in future (sustainability).The practice on how to take care of the planted tree was the most important part of the tree planting. The teacher should have emphasised this part. (see Section 4.5.6) for more insight). See Appendix I for an extract of the field notes.

3.3.7 Document Analysis

This method was used to read and analyse the documents that teachers used, and that the government produced that had relevance to the focus on teaching methods and that were related to the research question. The documents that I analysed were:-

- Policy documents on environmental education such as the:-
  - 1985 Conservation Strategy and the
  - 1994 National Environmental Action Plan.
  - 1996 Educating our Future, National Education Policy
- The Basic School Curriculum Framework for the year 2000
- WWF – ZEP Teacher Educators' manual

The latter two documents recommend integration of environmental education into different subjects at primary schools. Document analysis was used to find out if there was any foundation laid for the primary teachers' use of teaching methods.

Other important documents analysed in the research were the teachers' lesson plans, and the learners' work, as these provided important evidence of learner achievement, and teachers intentionality, as well as teaching and learning interactions (see Appendix J for an example of learners' work analysed).

3.4. DATA ORGANIZATION

This is a process of arranging the data into a more orderly pattern so that the researcher knows exactly what type of data he/she should start with; and so that the researcher can manage the corpus of data. I collected data according to the chronological order in which the research processes occurred. In this research the data was arranged according to the time at which the event from which it was drawn occurred.

In order to arrange the data in an orderly manner an inventory of data sources was made. The inventory made is shown below in Table 3.3.

Table 3.3 Inventory of data sources

Research Case	Data source	Description of data source	Dates conducted	Appendix Code
1	Pre-workshop questionnaire	Interview conducted with teachers before they had access to documents on teaching methods	29/03/10	A
2	Focus group interviews	Used for teachers to answer questions in a group	29/03/10	B
3	Questionnaire that compared existing methods with new category of methods	Teachers compared the use of existing methods and the use of new categories of teaching methods in integrating environmental issues	10/08/10	C
4	Focus group responses by	Teachers in groups answered questions on existing teaching	29/03/10	D

	teachers	methods		
5	Semi-structured questions on teachers' experiences before and after the two workshops.	Opportunity for teachers to reflect and evaluate their classroom teaching practice with existing and new categories of teaching methods.	10/08/10	E
6	Transcriptions of semi-structured interviews	An example of a transcribed semi-structured interview with one of the teachers.	10/08/10	F
7	Self-Completion questionnaire on teachers' own practice with new methods	An opportunity for individual teachers to describe their practice with existing and new teaching methods. Teachers needed not to be identified by name on questionnaire.	10/08/10	G
8	An example of a lesson observation instrument	A completed lesson observation sheet used to observe a lesson	07/04/10	H
9	Triangulation of research data	An example of triangulated field notes on a lesson that was observed first on sustainability of a tree planted by learners.	30/07/10	I
10	Evidence of learners' work	An example of learners' work that was analysed	29/07/10	J
11	Letter of authorization	To allow teachers and schools to participate in the research	12/02/10	K

A further step in the management of the data was to give each data source a code so that I could easily identify the different data sources from each other (represented in Table 3.3 below).

Table 3.4. Data index, showing codes used to differentiate data sources.

s/n	Index	Index code
1	Teacher Interview 1	TR I, 1
2	Teacher interview 2	TRI,2
3	Teacher interview 3	TRI,3
4	Teacher interview 4	TRI,4
5	Teacher interview 5	TRI,5
6	Teacher interview 6	TRI,6
7	Teacher interview 7	TRI,7
8	Teacher interview 8	TRI,8
9	Teacher interview 9	TRI,9
10	First Teachers' Workshop	TW1
11	Second Teachers' Workshop	TW2
12	Focus group 1	FG1
13	Focus group 2	FG2
14	Semi-structured Interview 1	SSI1
15	Semi-structured interview 2	SSI2
16	Semi-structured interview 3	SSI3
17	Semi-structured interview 4	SSI4
18	Post-lesson interview 1	PLI1
19	Post –lesson interview 2	PLI2
20	Post –lesson interview 3	PLI3
21	Post –lesson interview 4	PLI4
22	Field notes	FN
23	Document analysis	DA
24	Lesson observation schedule	LOS
25	Teacher 1	T1
26	Teacher 2	T2
27	Teacher 3	T3

28	Teacher 4	T4
29	Learner one	L1
30	Learner two	L2
31	Teachers Question	TQ
32	Household owner 1	HHO 1
33	House hold owner 2	HHO2
34	House hold Owner A 1	HHOA1.
35	House hold Owner A 2	HHOA2.
36	Group 1 leader question 1	GLQ1
37	Group 1 leader question 2	GLQ2
38	Teacher's Question 1	TQ1
39	Field notes	FN

3.5. DATA ANALYSIS

This is a method of considering what needs to be done with the data when it is collected and how the data will be processed. Data analysis can be deductive, inductive or abductive as described by Danermark et al. (2002). In this research I used inductive and abductive approaches to analysis. For Phase 1, an empirical interpretive analysis was done in which I identified the following categories for analysis:

- Existing teaching methods used
- Preferred teaching methods
- Teaching methods in use

Through this, valid conclusions were inferred from the observations that were made as teachers interacted to review and practice teaching methods (Danermark et al., 2002) see Chapter 4.

Abductive analysis was conducted for Phase 2 review of the data (see Chapter 5) This was achieved through interpreting and recontextualising the data so as to understand its meaning as interpreted within the conceptual and theoretical framework of the study (ibid. 2002). This involved developing a suitable analytical tool for this process of abductive data analysis.

This tool is presented below in Figure 3.1., and the justification for its development is presented in Chapter 2. Development of such tools for understanding educational quality, is supported by Barret (2009, citing Tikly, 2006) who stated that teaching methods needed an expanded mechanism in the form of a fabric of quality dimensions to effectively measure the quality of learning.

Nikel & Lowe (2009) dimensions of quality								Southern African dimensions	
Effectiveness	Efficiency	Equity	Responsiveness	Reflexivity	Relevance	Sustainability		Socio-cultural	Structural
Assessment									
Comments									

Figure 3.1 Analytical tool developed for abductively interpreting the quality of the lessons implemented (using the new preferred methods).

Through this process, the data in this research was analysed by considering it critically using the Nikel and Lowe (2010) dimensions of quality together with the Southern African socio-cultural and structural dimensions of quality; as explained previously. The analysis was able to provide evidence about the presence or absence of a dimension of quality (see Chapter 5).

3.6 RESEARCH DESIGN SUMMARY

The whole research design and process is summarised in Table 3.4 below. It shows how the action research and interpretive approaches worked together to produce the research results emerging from this study.

Table 3.5 Summary of the Research Process and Design

Steps	Action Research Processes	Data Generation	Phase 1 and 2 Analysis
1	First teachers' Planning workshop 1	Personal teacher's interview	Phase 1 Analysis: Inductive analysis of existing methods used; preferred new methods; and processes of using the new
		Focus group interviews	
		Choosing of new teaching methods	

		Planning of lessons using new teaching methods	methods; as well as teacher reflections on the use of the methods. Phase 2: Abductive analysis using the 9 quality dimensions (combined Nikel & Lowe 2009 with 2 Southern African features) Teachers makes reflective comparisons on the use of existing and new categories of teaching methods.
2	Lesson observations	Lesson implementation	
		Lesson observations	
		Post –lesson interviews	
3	Second teachers' Reflection workshop	Teacher makes comments on strengths and areas of improvement of lessons observed.	

3.7. VALIDITY AND TRUSTWORTHINESS

Various strategies were used to ensure that the methods of data collection were of quality, and so that the information collected was real and represented the activities that took place during research. Patton (2002) advocates the use of triangulation by stating "triangulation strengthens a study by combining methods". To ensure the credibility and trustworthiness of my study, triangulation of the data was done. This was achieved through using multiple data collecting techniques (document analysis, interviews, workshop data and observations) and this helped me to check for the integrity of inferences; as I could draw from multiple data sources. This is recognised by Cohen et al. (2000) who argue that data credibility is achieved through honesty, depth, richness and scope of the data, together with the extent of triangulation and degree of objectivity of the researcher. Since I used a case study approach which allowed me to undertake in-depth investigation of the cases under scrutiny, I used the thick description technique to interpret the patterns, categories and themes and to share them with readers (see Chapters 4 and 5).

Throughout the study, data generation and analysis processes were guided by the research purpose, research questions and content. This is supported by Maxwell (1992) who notes that validity is not just about what methods one uses, but whether the data, accounts and

conclusions made from those methods adhere to the purpose and context of the study. Face validity, as described by Lather (1986), is an important validity criterion that was achieved through member checking. To achieve this, I conducted feedback and reflection sessions with participants to verify the accuracy of interpretations of their discourse in interviews, observations, workshop interactions and focus group discussions.

I will also seek to ensure theoretical validity through consistent working with the theoretical framework of the study in relation to data, findings and explanation (Maxwell, 1992). As I was a participant observer during field visitations self-reflexivity (Lather, 1986) was key to maintaining research validity; and I used the field note strategy to assist me with achieving this. I have also clarified my position, role and interest in the study and at the end of the study (see Chapter 6), I reflect on my role in the research.

3.8. RESEARCH ETHICS

This is the research technique that considers the moral aspect of the research. It allows both the researcher and the participants to participate in the research without prejudice. The participants should carry out research activities without being forced into the activities. To ensure that I attended to the ethical aspects of the study, I did the following:

I ensured that teachers who participated in the research did so of their own choice and willingly,

The respondents to the questionnaires could choose to be known or not. All the participants chose to be known,

The participants were photographed with permission. All the participants accepted to be photographed and allowed the study to publish their photos,

The District Education Board Secretary (DEBS) authorised the study to take place in the schools and allowed teachers and learners to participate (See the letter of authorization from DEBS in Appendix K)

3.9. REFLECTION ON METHODS USED

The methods used in collecting data for the research were suitable. They had their strengths and challenges. The strengths have been outlined on each of the method above. Some challenges have been listed below:

Time constraints: I had to take time off the normal schedule of work to carry out some of the field work.

Timetabling in the school: I had to sometimes negotiate with the teachers to find a suitable time on the teachers timetable to carry out lesson observations. Sometimes it meant rescheduling some lessons because the teacher was doing some other official duties at school.

Examinations and tests in the school: when the time for observation is set it created some disturbances for the observation work. A period of three weeks was examination period for all schools in the district. It was a time for end of term tests. This meant that we had to wait until all tests were completed to start the last round of lesson observations.

Managing a lot of data: I also had a lot of data from the nine observations. In the end I could only use four of the data sets, as the scope of the study became too large.

I found the use of action research to be a helpful theory guiding the research, because it allowed for a process to unfold; while I could research the phenomenon that I was interested in.

3.10 CONCLUSION

This chapter focussed on the research design and the methods used in generating data in the research. Each method contributed to the generation of a specific type of data needed in the analysis of whether the teaching methods reflect dimensions of quality learning or not. Data management, analysis and trustworthiness issues are also explained in this chapter. The next chapter presents the data from the workshop and four lesson observations.

CHAPTER 4
METHODS WORKSHOP, LESSON PLANNING AND LESSON OBSERVATION

4.1. INTRODUCTION

In this chapter I present the data generated through the research process. I firstly share data generated in the workshop held with teachers. As discussed in Chapter 3, this workshop was intended to introduce teachers to a range of new methods that they could work with in their classrooms. The workshop was structured to firstly understand the nature of the existing methods used by teachers, and to find out why they were using these methods. This is reported in Section 4.2 below. Following this, I describe four of the planned lessons in detail, as observed in classroom observations that took place after the workshop. As mentioned in Chapter 3 the purpose of observing the lessons was to find out how the teachers who participated in the workshop were able to use the new categories of teaching methods. Lesson observations also provided information on how the teachers were using the new teaching methods that they selected in the workshop. Descriptions of the lessons are focussed on planning; implementation; and teachers' reflections. The detailed descriptions and analysis of each lesson presented in this chapter provides the basis for discussions in Chapter 5, where I consider the quality dimensions that were evident in the lessons.

4.2. EXISTING METHODS USED BY TEACHERS ESTABLISHED IN THE TEACHERS WORKSHOP

4.2.1 Existing Methods used by Teachers

During the first workshop, as a start up activity, teachers were asked to state the methods that they normally use. To do this, teachers were divided into two focus groups, as described in Chapter 3. Teachers were given a list of questions to consider, and teachers collated their responses and reported on these in the workshop. Preferred methods used by the teachers when integrating environmental issues or topics into their subject teaching included the following (ordered according to prevalence amongst the teachers).

- Discussion teaching method (all teachers, T1-9),

- Lecture teaching method (all teachers, T1 – 9),
- Question and answer teaching method (six teachers, T1, 2, 4, 7, 8, 9),
- Demonstration teaching method (four teachers, T1,5, 4, 8), and
- Group work teaching method (four teachers, T1, 2, 4, 5).

4.2.2 Reasons for use of existing methods reported by teachers

Teachers provided reasons for these preferred methods, which included:

- *Ease of use (T1 –9):* All nine teachers explained that the methods mentioned above were easy to implement because they involved only the act of talking and writing on the chalk board.
- *Easily accessible (T1 – 9):* All the teachers said that they liked the above existing methods because they involved teaching materials that were easy to acquire. Usually such teaching methods required a teacher to use teaching materials such as text books normally and easily provided by the school.
- *Easy preparation (T1, 2, 3, 4, 7, 8 and 9)*: These seven teachers explained that the existing teaching methods did not demand a lot of preparation time from teachers; they did not have to prepare a lot of additional activities. The teachers usually planned without involving learners, colleagues and parents or the head teacher.
- *Does not consume a lot of time to work with (T5, 7, 8 and 9):* Teachers said that time factor was a big challenge. They said many teachers were involved in what is referred to as "double class sessions" because there were a large number of classes to teach. Teachers were required to teach in the morning and afternoon sessions. This was why they opted to use teaching methods that required less time to prepare. Double sessions robbed them of time to prepare adequately for lessons or to implement different approaches to lesson planning.

In discussions on group work, teachers indicated that they liked using group work, combined with discussions because:

- The method allows learners to work on their own (T1, 3, 4, 5, 9),
- In most classrooms the desks and seats are pre-arranged permanently to allow pupils to carry out group work in English language lessons using a new method known as 'New

Breakthrough to Literacy' (NBTL); an initiative that was introduced to improve reading levels by the Ministry of Education in all schools throughout Zambia (T1, 5 and 7), and

- It allows learners to participate fully (T1 – 9).

4.2.3 Factors influencing choice of teaching methods

Teachers said the factors that influenced their choice of teaching methods included:

- *Characteristics of the learners (T1 –9) such as age (T8,9); gender (T1, 2, 7 and 9); and ability (T3, 5 and 9):* They agreed that a combination or learners' individual characteristics should be considered, whilst also providing detail related to each of the characteristics and how they influenced choice in method.
- *Age (T8, 9):* The teachers explained that young ages at the lower primary level needed teaching methods that would provide for more attention and care than the learners at upper primary school level. Younger children had a short span of attention and required the teacher to frequently change learning activities and methods. This was because lack of attention at lower primary level would promote noise and disturbances. With older learners, they recommended methods that provide challenging tasks to avoid a boring learning environment.
- *Gender* (T3, T4, T7, T9): The teachers explained that this factor affected teaching methods particularly in Southern African low income countries like Zambia where female learners are not allowed to wear certain sportswear which exposes the upper parts of their limbs. They are not permitted to wear swimming pants and swim in public places. This, they explained, would limit the teacher in his/her choice of games; influencing teaching methods to some extent. The four teachers explained that this factor was common in physical education where the teachers became biased towards the choice of feminine games such as netball as the only sport for girls leaving out other games such as football, badminton, chess and swimming because these were considered to be games for males only or vice versa. In Science female learners were not free in question and answer sessions, particularly when discussions involved certain reproductive organs, which girls were not meant to talk about due to traditional, socio-cultural and religious beliefs. The teachers reflected that some categories of teaching methods had a bias to advantage boys only or girls only. This is not in line with the current emphasis on equity as an important dimension of quality education (Tikly, 2006).

- *Ability of learners(T3, T4, T5):* The teachers said that the ability level and test scores of the classes influenced their choice of teaching methods. Some teachers had a habit of neglecting the use of effective teaching methods in classes labelled as 'dull' [sic] classes (classes where learners generally under-performed) because they had little interest in such classes. They explained that it was unfortunate that instead of using learner-centred teaching methods such as role play, the teachers developed a negative attitude towards the less able learners.
- *Availability of teaching materials material (T1, T5 and T6):* The teachers pointed out that availability of teaching materials was another challenge. Absence of teaching materials forced teachers to use teacher-centred methods such as lecture and discussion methods.
- *The context and environment in which the lesson is taught (T1, T8):* The teachers said they understood the words context and environment to mean the situation in which the lesson is taught. Teachers explained that in most cases they did not consider context in their lessons. This made them use inside classroom space to teach outdoor topics. Another example they gave was a situation where a teacher opts to lecture on a topic on diseases instead of inviting a specialized person like a nurse or environmental health officer to come to class.
- *The season during which the topic is taught (T1, 2):* The teachers said that the "I do not care" attitude amongst some teachers causes them to teach some topics at wrong periods of the day, week, month or the year. This attitude does not help learners. Teachers explained that some topics favoured some seasons while some topics favoured certain weather conditions and good timing.

4.3. TEACHERS ENGAGEMENT WITH NEW METHODS, DISCUSSED IN THE FIRST WORKHOP

4.3.1 Teachers working in pairs to deliberate preferred new methods

On the first day of the first workshop teachers worked with the following activities: reflections on the use of existing methods and reasons for using them; a discussion on the extent to which the use of the existing methods benefitted learners; going through extracts of two readings: Reading 1: Teacher Education Workbook for Environment and Sustainability Education (Rosenberg, 2007); and Reading 2: Methods and Processes in

Environmental Education (Rosenberg, Olvitt & O'Donoghue 2005). These were provided to stimulate discussion on new methods; to expand the scope of teachers' use of methods.

On the second day of the workshop the nine teachers were divided into four pairs. Preparation and presentation of lesson plans by using a preferred *new* teaching method (drawing on the inputs from Day 1) was the main activity of the second day of the workshop. Each pair was allowed to choose their preferred category of their new category of teaching method and plan two lessons in which an environmental issue was integrated in the learning area (subject) of the school curriculum at primary schools. Integration of environmental issues into different subjects was one of the recommendations in the different national policies. (MOE, 1996; METNR, 1985; MENTNR, 1994; METNR, 2007; discussed in Chapters 1 and 2).

Each pair was required to present one lesson plan to other teachers for discussion. It was agreed that those lesson plans would be used for teaching and observation at the schools where the teachers came from. Copies of the lesson plans were carefully filed for use during the period of lesson observation in the next two months.

To track the decision making of the teachers, I used an indexing system based on the paring of the teachers (outlined in Table 4.1 below).

Table 4.1: Indexing of data on teachers engagement with new teaching methods

DESCRIPTION OF INDEX	CODING OF DESCRIPTION	EXPLANATION OF CODES
Field notes	FN, (Date)	(FN, 07/04/10)
Teachers one and two of pair one	T1, T2, P1	Teachers one and two belonged to pair one.
Teacher three and teacher four of pair two	T3, T4, P2	Teacher three and teacher four belonging to pair two.
Teachers five and six of pair three	T5, T6, P3	Teachers five and six belonged to pair three.
Teachers seven, eight and nine of trio four	T7, T8 and T9, T4	Teachers seven, eight and nine belonged to the last group

		called a trio because they were three.

The table below shows the pairs of teachers divided into their preferred categories of new teaching methods before they chose more specific complementary new teaching methods associated with each of these categories (there are a number of different methods associated with each category, according to Rosenberg et al. (2005). The new teaching methods were divided into four categories of teaching methods (based on the Rosenberg, 2007; and Rosenberg et al. 2005 reading): Experiential Methods, Investigative Methods, Learning by Doing Methods, and Deliberative Methods (see also Section 2.2.2). After associating themselves with a selected category, teachers chose specific teaching methods which fall under the four categories. The teaching methods which fall under the four main categories were called complementary teaching methods.

Table 4.2 Teachers and their groups

Pair	New Category of teaching method	Pairs	Members	Name of teacher
1	Experiential	1	A (T1)	Tanasho Hidah
			B (T2)	Zulu R.S.
2	Investigative	2	A (T3)	Mwansa (Nshimbi) Edna
			B (T4)	Zulu Zeness
3	Learning by doing	3	A (T5)	Mwansa Regina
			B (T6)	Chishimba Everlyn
4	Deliberative	4	A (T7)	Milala Judith
			B (T8)	Kabole Christabel
			C (T9)	Bunda Rosalyn

The four main categories and the associated complementary new teaching methods preferred by the four pairs of teachers are shown in Table 4.3 below. The teachers agreed that teacher A of Pair 1 was to teach using complementary teaching method of option 1 while teacher B was to teach by using complementary teaching method of option 2. Teacher

2 of Pair 1 preferred to choose from either value clarification or role play as the table below indicates.

Table 4.3: Teachers in their groups and preferred choice of new teaching methods.

Pair	Category of teaching method preferred	Selected and preferred complementary teaching method option 1 to be used by Teacher A in each pair	Selected and preferred complementary teaching method option 2 to be used by Teacher B in each Pair
1	Experiential	T1: Music, poetry, art work (drawing)	T2: Role play or Value Clarification (will choose one of the two) Art work
2	Investigative	T3: Field work (household interviews)	T 4: Field trip (household interviews Field trip /investigative
3	Learning by doing	T 5: Practical action (tree planting)	T 6: Action taking (tree planting) Exploring indigenous ways of knowing
4	Deliberative	T 7: Social learning method (human resource, presentations, story line)	T7: Drama and theatre T 8: Story methods

4.3.2 Preferred Methods as selected by teachers

As shown in Table 4.3 above, Pair 1 (T1, T2)selected 'Experiential Teaching Methods' as their main category of method; which included the following complementary teaching methods:

- Interpretive trails,
- Solitaire,
- Music, poetry and art,
- Role play,
- Values clarification,
- Working with others.

Table 4.3 shows which associated methods they chose to continue working with. The teachers in this pair reported that the teaching methods in this category were completely new to them and they looked forward to studying and applying them in the demonstration lessons.

Table 4.3 above shows that Pair 2 (T3, T4)chose 'Investigative Teaching Methods' as their main category, which included the following complementary teaching methods:

- Field trips, excursions and exchange visits.
- Field work
- Lectures, presentations, demonstrations
- Guided questioning
- Case study
- Games and puzzles
- Media analysis

Table 4.3 shows which of these complementary methods they chose to continue working with. This pair of teachers reported that some of the methods were new except for the field trips, lectures, demonstrations which they also had practiced before. They had heard about some methods such as case study, but they have not used them. Media analysis teaching method was completely new to them.

Table 4.3 above shows that Pair 3 (T5, T6)chose 'Learning by Doing Teaching Methods' as their main category, which included the following complementary methods for the category:

- Practical action taking,
- Models and experiments (also investigative),
- Exploring indigenous ways of knowing,
- Project work (also investigative),
- Action research and community problem solving.

Table 4.3 shows which of these complementary methods they chose to continue working with. Teachers in this pair reported that they were familiar with project work although they

do not regularly use it. The rest of the complementary teaching methods in this category were new to them.

Table 4.3 above shows that Trio 4 (T7, T8 and T9)chose **'**Deliberative Teaching Methods' as their main category, with the following complementary teaching methods:

- Story methods
- Social learning methods
- Participatory methods
- Dialogical methods
- Drama and theatre for development
- Scenario planning and backward mapping

Table 4.3 shows which complementary methods they chose to continue working with. The teachers reported that they were only familiar with the story line method. The rest of the methods in this category were new.

4.3.3 Selecting new methods and teachers' reasons for selecting particular kinds of new methods

Teachers used the plenary session of the workshop to discuss their engagement with existing and the new categories of methods that were introduced in Reading 1 and 2 above (which grouped the methods into the four categories discussed above). They reflected that the two readings revealed that they had been using the same type of existing methods repeatedly throughout the whole year. The teachers reflected that the repetition of using the same type of teaching methods did not provide a wide range of teaching methods. (T1, 2, 7 and 9).

After making this reflection, teachers became interested in finding out more about other forms of teaching methods that would open them up to a wider range of teaching methods. After making comparisons between the different types of methods, the teachers were allowed to continue preparing for the implementation of the lessons in their real school situation and for observation. The teachers were eager and looked forward to trying the new teaching methods in their schools.

4.4. LESSON OBSERVATIONS: PLANNING AND IMPLEMENTATION

4.4.1 Preparation for lesson observations and implementation

The teachers who participated in the workshop agreed to prepare, teach and implement a lesson that would be observed at school. They agreed that each pair would work together initially to plan and teach one lesson plan using one of the new methods. Each would be from a different category (as identified in Table 4.3). The teachers working in pairs then prepared a second lesson plan for the other partner for the purpose of teaching and observation.

4.4.2. Schedule for lesson observations and reporting on lesson observations

A timetable for observing lessons was agreed upon with the teachers. Each teacher was aware of the date he/she would be observed. There were two lessons from each category of new methods except for group 4 which had 3 members; making nine lessons in total. While I observed all of these lessons, in consultation with my supervisor during the analysis and write up phase, it was decided that for the purposes of this half thesis study, I would report only four of these lessons in depth (one from each category of data); as the bulk of the data became too extensive. Also, because teachers planned the first 'new methods' lesson together (as noted in Section 4.4.1 above), lessons offered by the two teachers in the pair were quite similar. Because the focus of the research requires the capturing of a lot of detail and depth in order to fully interpret the quality criteria, it was decided that it would be better to report four lessons in depth, rather than nine lessons in less depth. This is in keeping with case study research design (see Chapter 3).

4.5. LESSON 1 IMPLEMENTATION: MUTUNDU BASIC SCHOOL

4.5.1 Category of Method and Other Methods

This lesson observation focussed on a lesson from the 'Learning by Doing' Teaching Methods category. The complementary teaching method selected by the teacher for the lesson was the 'Practical Action Taking Method'. The action to be taken by the class was tree planting.Other teaching methods used to support learning were:

- Question answer during the introduction and rest of the lesson,
- Discussion during the group work,
- Presentation for group reporting, and

- Demonstration during tree planting.

4.5.2 Planning of lesson 1

The teacher planned the lesson according to the format and plan agreed upon at the workshop. The main parts of her lesson plan were:

- ***General information:*** This part indicated the general information about the school including, Name of school: Mutundu Basic School;Date: 06/04/10; Subject: Integrated Science; Topic: Environment; Sub-topic: Forests; Gender of learners: boys only**;** Grade: 6Time: 10.00 hours;Duration: 80 minutes.

- ***General outcomes of the lesson:*** The teacher planned that at the end of lesson the learners should be able to:
    - Develop knowledge, and positive attitude and values for their immediate environment, and
    - Develop investigative skills.

- ***Specific learning outcomes:*** The teacher planned that the learners should be able to:
    - Explain the importance of forests
    - Discuss the effects of deforestation
    - Discuss ways in which forests can be preserved.

- ***The introduction:*** The teacher planned to introduce the lesson by revising the previous lesson which focussed on the idea of keeping the environment clean. The teacher planned to ask the learners to state reasons why the environment should be kept clean. The expected answer from learners was to avoid diseases such as cholera.

- ***The lesson development:***This is the part of the lesson plan that indicated how the teacher was going to implement the specific objectives listed above through teacher's and learner's activities (details are provided in the actual lesson description below).

- ***The conclusion:*** This was the stage at which the teacher planned to summarize and end the content of the lesson in a systematic manner.

- ***Evaluation**:* This part of the lesson plan was to be completed after the teacher had finished teaching the lesson. The teacher planned to comment on the strengths and weaknesses of the teaching and learning process and the performance of the learners. The strengths of the teacher include the positive side of the teaching methods, strategies, and approaches. The weaknesses were to be supplemented by suggestions for improvement.

4.5.3 Implementation of lesson 1

This is the stage of the lesson when the teacher put into action all that had been planned and written in the lesson plan and all that had been discussed at the workshop.

- **Introduction of lesson:**

The teacher started the lesson by asking a question about the environment. The questions asked by the teacher are written below:

What does the word environment mean? (LQ1).

How can we keep the environment clean? (LQ2)

Why should we keep the environment clean? (LQ3)

The learners' responses were: "The environment is our surroundings" (L1); "The environment is everything that is around us". (L2)

- **Lesson Development: Teachers Activities**

During this part of the lesson the teacher wrote the following four words on the chalkboard, and then implemented and proceeded to engage learners through a number of teaching activities:

1. Forest 2. Oxygen 3. Deforestation 4. Wood

Teacher activity 1: The teacher asked for four boys to walk to the front of the class, pick a word and explain what the word meant to the whole class.

Teacher activity 2: The teacher pointed to the roof and asked the learners what they saw. Teacher used question and answer, observation and discussion complementary methods in this activity.

Teacher activity 3: The teacher distributed the learners' workbooks and asked the learners to open their books on page 37. The book was the '*Breakthrough to Integrated Science'* text book. They were asked to explain what was on the page.

Teacher activity 4: The teacher divided the learners into four groups and gave each group a different task. Teacher instructed the members of each group to select a group chairperson to lead the discussion, a group secretary to write and to present the conclusions of the discussions to the class.

Teacher activity 5: The teacher asked group 3 the following questions: "Why will there be no oxygen if forests are cut down?" (TQ4); "Why will there be no medicine if trees are cut down?" (TQ5). The question to group 4 was: "How can you make sure trees that are planted grow well?" (TQ6)

Teacher activity 6: The teacher had a whole class discussion on the effects of deforestation.

Teacher activity 7: The teacher conducted the practical action part of the lesson in the form of a demonstration, by planting one tree with the learners outside the class. The materials she used included a potted tree from her own home, a hoe, composite manure and water. The teacher explained that the tree would need to be cared for, if the tree was to survive. She explained what needed to be done to care for trees.

- **Lesson Development: Learners' activities**

Learners' activity 1: Four boys walked up front, each chose a word from the board and explained as follows:-

Oxygen is used for breathing (L1)

The forest is the place where plants live (L2)

Wood is used for making chairs (L3)

Deforestation is the cutting down of trees (L4).

Learners' activity 2: A learner indicated that he saw "*wooded planks on which the roofing sheets were resting"* (L5). The teacher said that was another used of wood.

Learners' activity 3: A learner answered that he saw the following in the drawing on page 37: "Cows that appeared as if they were starved" (L6); "Trees that appeared as if they had been cut down" (L6).

Learners' activity 4: The learners in groups discussed the following questions:Group 1 discussed the question "why are forests important?" Answers from the group discussions were as follows:"People get fruits from the forest; forests give shade to people and animals; provide fire wood; for building; make gardens in forest; collect plants to plant to beautify community" (G1). On reasons why people cut trees group 2 responded as follows:"To get charcoal; to get food such as fruits, mushrooms; to sell trees for money; to get wood" (G2). The responses of group 3 on what could happen if the whole forest is cut down by people were:"It would become difficult to get medicine from forests; land becomes a desert; no shade for animals; and people; no oxygen, because trees produce oxygen; no food" (G3). The responses by group 4 about what should be done to a forest where all trees have been cut down were:"Plant trees; make sure the trees planted grow well" (G4). On the importance and uses of forests learners said that "trees provide medicine" (L13); "Trees provide fruits and other foods" (L14). The learners explained that "People who cut down trees should be arrested and reported to the police, forest rangers and the neighbourhood watch groups". (L15).

Learners' activity 6: the learners as a whole class discussed and explained that the disadvantages of deforestation are that it: "causes climate change" (L16); "It causes poverty because there will be no fruits such as mangoes and wild fruits"; "It causes lack of herbal medicine" (L17). The teacher did not correct learners' views that deforestation 'causes' climate change or poverty [rather than exacerbates these issues].

Learners' activity 7: Planting of a tree outside the classroom. The teacher took members of the class outside and planted the tree. Different learners participated in the action taking process by clearing a circular space of about one meter diameter with a hoe (L19 and L20).Used one hoe to dig a hole about 25 cm deep where a learner planted the potted plant. L21 and L22 collected composite manure to add to the soil in the hole with the plant. L23 and L24 collected water in a 25 litre container. L25 and L26 participated in planting the tree by making sure it was well fixed in the soil and was well supported in the soil. L27 and L28 watered the tree that was planted. The tree was planted about 80m from the classroom.

4.5.4 Knowledge generated in the lesson

As shown in the description above, which included knowledge that forests are part of the environment; forests have many uses; trees can be planted to replace the trees cut down;

cutting down all trees without replacement can cause problems for human beings, and can contribute to issues such as poverty or climate change.

4.5.5 Teacher's level of knowledge

The lesson reflects that the teacher thought carefully about the content of the lesson, and tried to give the topic broad coverage; although the content seemed to be a bit simplistic for Grade 6 learners. The teacher's level of knowledge was adequate, but it was notable that the teacher did not correct learners' views that deforestation 'causes' climate change and/or poverty. This was an important opportunity for knowledge expansion that the teacher did not use. The teacher also did not give learners challenging tasks, because most of the questions asked were recall type questions. The teacher did not challenge learners with questions that reviewed lifestyles and attitudes towards tree replacement at the school or community level. She did not probe causes of deforestation critically with the learners, but remained at a more 'basic' knowledge level asking learners to share what they know, and discuss in groups. New knowledge introduced was minimal.

4.5.6 Teachers' reflections on the lesson

The teacher indicated that she was trialling the new method of Practical Action within the Learning by Doing methods category. She explained that through the new category of teaching method she was able to provide her own tree to plant from her own garden. She reflected that through the complementary method of Practical Action she was able to involve the learners in taking part in the action of planting the tree as part of the teaching and learning process. "This normally does not happen", she explained. But after the workshop on new environmental teaching methods she had to look for the plant as a teaching aid for taking action. The new method allowed the learners to be involved in looking for composite manure, water, good loam soil, and hoes which they used to plant the tree outside the class room (FN, 06/04/10).

4.5.7. Socio-cultural and structural dimensions in lesson 1

Structural dimensions that influenced the teaching of the lesson included the availability of textbooks which the learners were able to use; as well as the teachers' ability to source a tree. Without the tree the lesson would not have been able to include the Practical Action

component. However, only having one tree limited all learners' chances to participate in the practical action, and only some of the learners were able to do some of the actions needed to plant the tree. Wider structural issues, besides the large class, affecting the lesson were the context of poverty and climate change, which the learners' mentioned, but the teacher did not discuss further with them.

The teacher reflected that including social-cultural aspects into her lessons was new to her. She reflected on the lifestyle of many Zambians which involved heavy reliance on charcoal for domestic energy. She said she did not cover that part in the lesson plan. Thus, an important contextual dimension of the deforestation issue was simply excluded from the lesson, as the teacher chose to work with more 'traditional' school content knowledge, which is often not contextualised. She also did not discuss the name of the specific tree that was being planted, or its social or cultural significance, thus losing another potentially enriching teaching and learning opportunity. After participating in the workshop and reflecting on this issue, she noted that she would slowly adapt to integrating the socio-cultural and structural issues in teaching and learning. (FN, 06/04/10).

4.6. LESSON 2 IMPLEMENTATION: MUTAMBA BASIC SCHOOL

4.6.1 Category of new teaching method and complementary methods

The category of teaching method used was 'Investigative Teaching Methods'. Associated complementary teaching methods used were: Field work and household interviews. The learners carried out an actual household interview with two neighbouring households.

Other supporting methods were:

- Lecture method during introduction of the lesson,
- Question answer during the household interview,
- Discussion during the group work,
- Presentation for group reporting,
- Cooperative learning during choice of group secretary and chairpersonship, and
- Worksheets.

4.6.2. Planning of lesson 2

The teacher planned the lesson according to the format and plan agreed upon at the workshop. The main parts of the teacher's lesson plan were:

- ***General information:*** This part of the lesson plan included the following: School: Mutamba Basic School; Date: 07/04/10; Subject: Mathematics; Topic: Sets; Sub-topic: Intersection of sets; Grade: 6; Time: 08.00 hours; Duration: 80 minutes; Teaching Resources: worksheets.

- ***General outcomes of the lesson*****:** The teacher planned that after the lesson the learners should be able to 'identify and group common objects into one set'.

- ***Specific outcomes*****:** The teacher planned that by the end of the learning experience learners should be able to:
    - List the crops grown by the community,
    - Name the animals kept by the community,
    - Suggest ways of disposing refuse, and
    - Illustrate the gathered information in a Venn diagram.

- ***Introduction of the lesson***: The teacher planned to introduce the lesson by going through the list of lesson objectives (learning outcomes).

- ***The lesson development*****:** The teacher planned to develop the lesson through four different steps listed below:
    - **Step 1:** The teacher planned to ask learners to state the domestic animals and crops grown and kept at their homes.
    - **Step 2: T**he teacher planned to involve learners in interviewing owners of two households near the school about the crops they grow, the type of domestic animals they kept and the method by which they dispose of their waste by using questions already written on the worksheets by the teacher.
    - **Step 3:** Teacher planned to use information from the interviews to draw sets of crops grown and animals kept by two neighbouring households.

- ***Lesson conclusion***: The teacher planned to summarize the activities and show how the activities would be converted to the concepts of sets and intersections of Venn diagrams.

- ***Evaluation**:* The teacher would complete this part of the lesson plan after teaching the lesson. It is a stage for reflecting over the lesson activities as discussed in the first lesson above.

4.6.3. Implementation of lesson 2

- **Introduction of lesson 2**

The teacher asked the learners to mention the domestic animals they reared at their homes and the crops they grew. After writing the learners' answers on the chalkboard she wrote and explained the learning outcomes of the lesson on the chalkboard.

The teacher wrote the topic *'Sets'* and the sub-topic *'Intersection of sets'* on the chalkboard. She then told learners that they were going to learn about sets, intersection of sets, union sets, and subsets by investigating and comparing the type of crops grown, type of animals kept and the methods of refuse disposal practiced by two households that live near the school.

The teacher explained that the class would go on a field trip to the two homes near the school to interview the house owners about the crops they grew and domestic animals they kept. She informed the learners that they were going to ask questions written on the worksheets that she prepared.

- **Lesson development: Teachers' activities**

Teacher activity 1:The teacher asked the class to divide into two main groups, choose a chairperson to lead the group in asking questions and a secretary to record answers and to report findings to the class at the end of the interviews. Further instructions were that group 1 would interview house no: 5 while group 2 would interview house no: 7.

Teacher activity 2: The teacher distributed the worksheet to learners and led them to the two households and asked the learners to discuss the questions with the house owner and collect information from the household owner on crops, animals and waste disposal.

Teacher activity 3: The teacher guided the learners that the questions they would ask the household owners would be related to the following issues.

- *To state the crops grown by house owner*
- *To state the animals reared*
- *To classify the crops into categories*
- *To identify the animals the neighbouring households keep*
- *To classify the animals into categories*
- *To find out if the types of crops between household 1 and 2 are similar or different*
- *Describe the methods they used to get rid of the rubbish at their houses.*

- **Lesson development: Interactions during fieldwork between teachers, learners and community members**

*Interaction 1:*The teacher took learners on a field trip to the two households for interviews. She told the learners that the class was going to compare the answers from the two households after the interviews to find out if there were any similarities and differences in the crops grown, animals kept and methods of refuse disposal. At the first and second household the teacher asked the owner of the house to choose his or her preferred language of communication. The owner of house no: 5 chose to speak in *Icibemba* the local language widely spoken in the Copperbelt Province in Zambia. The owner of house no: 7 chose to speak a mixture of English and the local language.

Interaction 2: Interview at household 1 (house no: 5): The group leader started to ask questions in the local language as follows:-

> ***Question:*** *"What crops do you grow?" (GLQ1). The house owner said, "Maize, groundnuts, cassava, sugarcane and onion" (HHOA1).*
>
> ***Question:*** *"What animals do you rear?" (GLQ2). Answer: "Chickens and ducks" (HHOA2).*
>
> ***Question:*** *"How do you get rid of waste generated by your family" (GLQ3). Answer: "Green waste is fed to ducks while the dry solid waste is buried in the garden to make composite manure and some is thrown in the dug-out pits" (HHOA3).*

The teacher asked the learners in a local language if they had noticed any crops which were not mentioned by the household owner (TQ4). The learners said "Mulembwe (a local slippery vegetable Zambians relish), flowering plants, sweet potatoes, mango trees, lemon

tree" (L4A). The teacher asked where the family bought feed for the chickens and ducks (TQ5). The house owner said: "We buy from shops, but sometimes we grind or pound our locally grown maize and extract feed from it. Green grass is obtained from the wild dambos" (HHOA5). The teacher and learners visited the garden and animal house before leaving house no: 5 and went to house no: 7 for their second interview.

*Interaction 3: Interview at household 2 (house no: 7):*After the teacher greeted the owner of the house and introduced the class the leader of group 2 started asking the house owner questions.On the question about crops grown the owner took the learners to the garden and showed them a garden where the family grew crops such as rape, cabbage, cassava, impwa (egg-plant), millet, pawpaw, snake chasers (a leguminous nitrogen fixing wooden plant), lubanga (a bitter-tasting local Zambian indigenous vegetable), mango, and sweet potatoes (HHOA6). On the question of animals kept, the owner took them to the animal house where she showed them animals such as chickens, ducks, and rabbits (HHOA7). The learners got excited and wanted to touch them and have a closer look at them. In response to the question of waste disposal, the owner explained that waste was collected by Mufulira Municipal Council and that waste from the garden was made into compost (mixed with manure). She said the family practiced "five years of crop rotation with maize, beans and sweet potato plants" (HHOA8).The teacher explained to the learners that what the house owner said was an example of crop rotation. When learners asked about the heap of scrap metal on the roof of the animal house the owner said the family had started sorting out scrap metal from other forms of waste because it takes long to decay while leaves and grass decay after a short period. The teacher again explained to the learners that leaves were bio-degradable but plastics were non-biodegradable. When the group 2 leader asked about the source of feed for rabbits (G2LQ9), the owner said "cabbage, rape lettuce cut-out from the garden and grass from the nearby bushes" was used to feed the animals (HHOA9)**.** The group secretary was writing all the answers provided by the house owner.

- **Lesson development: Learners' activities**

The learners answered the questions at the introduction of the lesson; listened attentively to the instructions about the field trip and household interviews they were going to be involved in. They chose their group leaders and secretaries as instructed by the teacher. The

learners participated in the field trip interviews as outlined above. However, learners also had other tasks to complete when they returned to class.

Sharing time of Lesson 2: Part 1: Through the use of question and answer method, the teacher and learners discussed how information from the interview could be converted to mathematical sets. The teacher asked each group secretary to read the findings from the interviews while she wrote answers on the chalkboard. The findings are shown in Table 4.4 below.

Table 4.4: Crops grown at the two households

CROPS GROWN AT THE TWO HOUSEHOLDS	
CROPS GROWN AT HOUSE HOLD 1	**CROPS GROWN AT HOUSE HOLD 2**
Groundnuts	Sweet potatoes
Cassava	Millet
Sugar cane	Snake chasers
Onions	Pawpaw
Maize	Lubanga
	Mango
	Maize

The teacher asked the learners, "*Which crop is grown by both households*?" A learner answered and said "*Maize*" (L8). The teacher explained that the crops grown by household 1 can be described to be set A and the crops grown by household 2 as set B. The teacher explained further that the crops in household 1 can be labelled to be members of set A and those in household 2 as members of set B. She explained that the crop grown by both households 1 and 2 is the intersection of the sets, which is maize. She then explained that the column of household 1 items should be labelled as set A and the column associated with household B as set B. The teacher asked the secretaries to read the findings about animals kept by both households. The information provided by the secretaries is shown in Table 4.5 below.

Table 4. 5: Animals kept by households 1 and 2

ANIMALS KEPT BY HOUSEHOLDS 1 AND 2	
HOUSEHOLD 1 (SET A)	**HOUSEHOLD 2 (SET B)**
Chickens	Chickens
Ducks	Ducks
	Rabbits

After writing these on the board, the teacher explained that household 1 was a subset of household 2. This was because household 2 kept three types of animals while household 1 kept only two types of animals which were the same as those kept by household 1. She explained further that because the types of animals kept by household 1 were the same types of animals kept by household 2, the animals of household 1 made a subset of the animals of household 2.

She then went on to explain that sets of refuse can be created into a set of bio-degradable waste as a set 1 and set of non-biodegradable as set 2. They did not divide observed waste into sets on the board in the same way as they did the crops and the animals.

Sharing time of Lesson 2: Part 2: The second activity associated with sharing the fieldwork experience was done through group work activity, described below:

Class activity: The teacher divided the class into six groups and asked them to do the activity on sets using the questions below:

In your groups draw sets which represents the following:
(i) sets of different crops from household 1 and 2
(ii) Intersection of sets of different crops between sets of households 1 and 2
(iii) Subsets of different animals of households 1 and 2
Submit your work before the end of the period.

The work by groups was submitted to the teacher and teacher concluded the lesson with the explanation and drawing of the sets in the activity (shown in Figure 4 below).

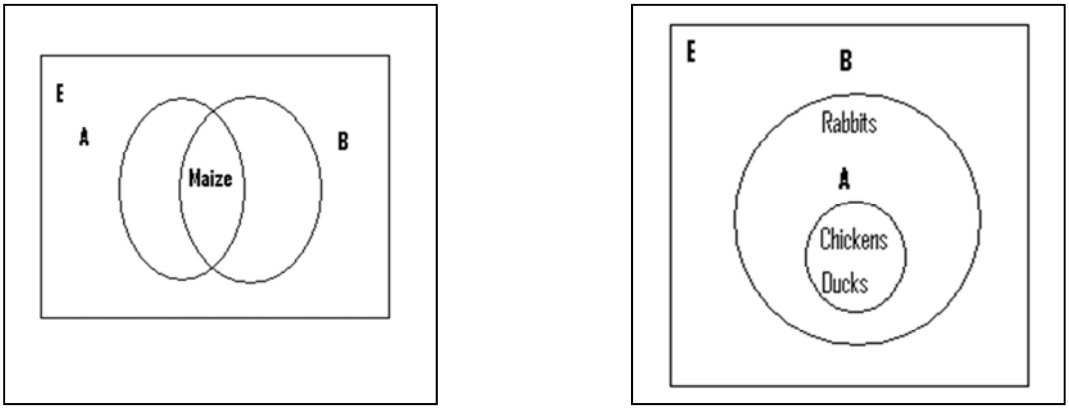


Figure 4: Diagrams of sets (intersecting sets (1) and subsets (2))

- **Conclusion and homework**

The teacher summarised the activities and concluded the lesson. She gave the learners an exercise to as homework for the holiday as follows:-

Q1. Visit 4 households in your neighbourhood and investigate by interviewing your friends about crops and animals and waste disposal using the same questions that were asked to household 1 and 2 at school.

Q2. Make sets of your findings and draw diagrams showing the following;-

Sets of different crops, animals, waste types

Intersections

Subsets

4.6.4 Knowledge generated and learnt during lesson 2

The teacher and learners generated the following knowledge: Families can grow their own food and food for feeding their domestic animals; compost can be made locally; waste can be sorted out as at household no: 7; animal feed can be made by pounding maize grain; animals and crops are grown and kept for various functions. They also learned that members of different households grow different crops for various reasons such as for food, commercial, medicine, beautification of home surroundings, agricultural, ecological and for environmental reasons; and that members of different families keep different animals for reasons ranging from food, commercial, recreation, sport, agricultural, ecological and

environmental reasons. Furthermore, they learned that some waste is biodegradable while some waste is non-biodegradable. The learners learnt that biodegradable waste can decay while non-biodegradable waste takes long to decay and therefore special ways of disposing such waste are needed. They also learned that members of sets can be formulated from the objects in the environment; and that it is possible to observe sets, intersections of sets, and subsets in the environment.

They also learned that knowledge can be shared and generated through team work, cooperative learning and group discussions, and that each learner is responsible for his/her own learning during the fieldwork and household interviews; but that it helps to have a group leader and someone to take notes during collaborative fieldwork activities. The acquisition of knowledge through investigative and interview methods in Lesson 2 resonates with the recommendations in the Zambia basic curriculum framework that learning should occur through the interaction with the community and that after school hours learning should continue (Zambia. MOE, 2000:9). Thus, through this simple mathematics activity focussing on sets, learners were able to learn a great deal more than just the mathematical principles of sets, intersections of sets, and subsets.

4.6.5 Teacher's level of knowledge

The teacher's level of knowledge was good in mathematics because she was able to guide the learners clearly. Her knowledge of how to use the investigative new method was good, especially since she had not used it before; her knowledge of environmental education terminology was not adequate because she said she had little knowledge about the concept of sustainability, but she was able to assist learners to differentiate between biodegradable and non-biodegradable waste. She said she did not refer to the objectives of the curriculum framework and theories of learning when planning her lesson and this teaching approach does resonate with the needs of society.

4.6.6 Teachers reflections on lesson 2

In post-lesson reflective interviews, the teacher reflected that the results of the lesson conducted with the new teaching methods of investigative household interviews and field work were beneficial to the teacher and the learners because the new method allowed learners to go out to learn in the community; and because learning was conducted in an

informal manner. She also saw the method as useful because it allowed learners to grasp mathematical concepts, and to derive them and relate them to everyday life situations. She reflected that through this method, concepts of mathematical sets, intersection, union sets and subsets were clearly conceptualised and operationalized by the learners in the field, and through this, environmental issues were integrated into a mathematical lesson in a very clear way. She also liked the fact that the mathematical concepts were made simple and clear through the local environmental reference. She felt that values, relevance, effectiveness and efficiency was reflected in the lesson (FN, 07/04/10). The teacher said that if she had not participated in the methods workshops where alternative methods were discussed, and chosen, she would have used the usual lecture method to teach sets (FN, 10/08/10).

4.6.7 Socio-cultural and structural dimensions influencing the lesson

The teacher reflected that the socio-cultural dimensions that were captured in the lesson included the provisions made for using local language during the interview by both the house owner and the learners to make their expressions fluent and clear. Observations, questions and answers included discussions on indigenous vegetables. Local methods of producing chicken, other forms of animal feed, and composting and waste management practices, were all further aspects that brought out socio-cultural dimensions in the lessons. Experiencing the interview process and the drawing of sets afterwards, and learners' familiarity with the activity, made the homework task easy to follow; and allowed for further applications of the mathematical learning in the real life context of the learners.

Arrangements made to seek permission for the fieldwork from the head teacher and house owners to interview them, were important structural dimensions influencing the lessons. The teachers' strategy to group the learners into two groups also proved to be an important structural arrangement that facilitated the smooth development of the lesson, and allowed more learners to participate directly in the lesson.

4.8. LESSON 3 IMPLEMENTATION: MUFULIRA BASIC SCHOOL

4.8.1. Category of new teaching method and complementary methods

Category of teaching method used for this lesson was 'Experiential Teaching Methods' and the associated complementary method was role play. Other methods used to support the experiential method included:

- Question and answer during the introduction and rest of the lesson,
- Discussion during the group work,
- Presentation for group reporting, and
- Demonstration during preparations for the role play.

4.8.2. Planning of lesson 3

This lesson, planned for a lower primary class of Grade 2 learners was short (30 minutes). The teacher planned the lesson according to the format and plan agreed upon at the workshop. The teacher followed the lesson plan format discussed during the workshop. Her lesson plan included the following:

- ***General information:*** This part of the lesson plan indicated the general information such as: School: Mufulira Basic School; Date: 2/7/10; Subject: Social development Studies; Topic: Common diseases; Sub-topic: Diarrhoea was the subtopic; Grade: 2c; Time:10.30 hours; Duration: 30 minutes.

- ***General outcomes*****:** The teacher planned that after the lesson the learners should be able to "Describe the causes and prevention of diarrhoea".

- **Specific learning outcomes:** Teacher planned that after having presented the lesson the learners should be able to:
  - *Mention causes of diarrhoea*
  - *Role play causes of diarrhoea*
  - *Explain how to prevent diarrhoea*
  - *State how water is polluted in the stream*
  - *Draw a picture on diarrhoea*

- **Lesson introduction**: Teacher planned to revise previous work on HIV/AIDS.

- **Lesson development:** In this part of the lesson plan, the teacher indicated how she was going to develop the lesson step by step from one concept to the next. She planned to implement the specific objectives for teaching about diseases, step by step (as indicated above). Each of the teacher's and learner's activities in the lesson was allocated a time frame for implementation.

- **Conclusion**. The teacher planned to put the main parts of the lesson into one summary and to close the lesson.

- **Evaluation**: This part of the lesson plan is completed after the lesson has been taught. It describes the strengths and weaknesses of the teaching and learning process. The teacher planned to do it at the end, after the lesson was taught.

4.8.3. Implementation of lesson 3

- **Introduction of the lesson**

The teacher started the lesson by asking a question about HIV/AIDS. The question she asked was: "What are signs of HIV/AIDS in a human being? (TQ1)" Learners' answers included: "vomiting continuously" (LA1); "Loss of weight" (LA2).

- **Lesson development: Teacher activities**

The teacher developed the lesson step by step as follows: Step 1: Discussion on what learners knew about diarrhoea; Step 2: Role play by learners on cause of diarrhoea; Step 3: Discussion on prevention of diarrhoea; Step 4: Explanation on water pollution; Step 5: Drawing picture related to diarrhoea on a chart. These are reflected in the teacher activities below, and learner activity responses.

Teacher activity 1: The teacher asked learners how diarrhoea is caused? (TQ3).

Teacher activity 2: The teacher asked the learners to role play a situation on causes of diarrhoea. She guided the learners to allocate each other specific roles in readiness for the role play. With her constant guidance, the learners regrouped themselves into the play's characters and started to act. The role play demonstrated that there were the following characters: medical doctor; female parent; school teacher; school girl; household; toilet;

marketer (person who sells goods at a market). Materials used in the play (provided for and guided by the teacher) included: a pen and string representing doctor's stethoscope, desk representing a household; desk representing marketer's table for displaying goods for sale, counterfeit paper money notes.

*Teacher activity 3***:** After the role play, the teacher explained to the learners how to prevent diarrhoea. She told learners to be careful with fruits and other foodstuffs sold on open streets because the food is not covered. It is easy for bacteria and viruses to be contained in such uncovered foods. She said that to prevent diarrhoea learners should ensure that both the foods and hands should be washed before cooking or eating; and that learners should wash hands with soap after using the toilet.

Teacher's activity 4: The teacher asked learners to draw a picture of what can cause diarrhoea.

- ***Lesson development: Learners' activities***

Learners' activity 1: Learners answered the teachers' question verbally by stating the causes of diarrhoea. Their answers included: "eating food without washing your hands" (LA3); "eating food without washing the food" (LA4); "eating any food sold in open places without covering it" (LA5); "visiting the toilet without washing hands with soap" (LA6).

Learners' activity 2: The learners participated in the role play and took on different roles. The main parts of the role play included: School girl goes to school for learning; on her way from school she buys uncovered food on the open market; she eats food bought from the open market without washing the food and without washing her hands. When she reaches home she finds her mother has prepared food for her. She goes to the toilet and after using the toilet she does not wash her hands with soap and starts eating bread with tea without washing her hands. After one hour of eating she feels a stomach upset and pains. She goes to the toilet and passes a watery stool. After returning from the toilet she only stays for 10 minutes and again she feels pain in her stomach and again she goes to toilet and passes a watery stool. After going to the toilet for the third time in a short time the mother takes her to the hospital where the doctor finds out that she had contracted diarrhoea. The role play ended with the teacher reminding the learners that the time for the end of role plays had come.

In the role play, learners demonstrated the following: cooperation amongst themselves, leadership roles, creativity, originality, responsibility, synthesis, application of knowledge, comprehension, and imagination.

Learners'activity 3: learners discussed with one another in groups and presented their answers on the prevention of diarrhoea.

Learners' activity 4: Learners drew the following: food vendors with uncovered fruits such as mangoes, oranges and pawpaw.

4.8.4. Knowledge generated during lesson 3

The following knowledge was generated during the lesson: That hygiene is essential in preventing diseases; buying food from places that are not recognised markets can be dangerous; that eating food without washing hands; and eating food such as fruits bought from public markets without washing it is not safe because it can cause diarrhoea. Learners also learned what to do to prevent diarrhoea and when to go to the doctor or clinic.

4.8.5. Teacher's level of knowledge during lesson 3

The level of knowledge for teaching Grade 2, lower primary was good and adequate. The teacher reflected that the learners had played the roles showing the features, causes and prevention of diarrhoea very well. She said that she needed training in environmental education so that she could integrate environmental issues more easily.

4.8.6. Description of what the teacher said about lesson 3

During reflective interviews, the teacher reflected that the new method allowed the learners to do the following: They put their imagination into action; took responsibility for the role and character they played; made meaning of the concepts. As they played their individual roles they learnt the concepts in a fun and adventurous manner (FN, 02/07/10). The teacher explained that the new method benefitted the learners in many ways such as: "The learner will not forget easily the part she/he played during role play"; and "the role play will make the learners apply the knowledge in their daily lives" (FN, 02/07/10).

4.8.7. Socio-cultural and structural dimensions in lesson 3

The teacher reflected that there were some activities that were not fully played by learners as a result of the culture of the learners such as:The learner who acted as a patient of diarrhoea did not fully squat to a position of a person in the toilet passing a watery stool because she was female. Females in Zambia are taught to be reserved, not to be extrovert. Gender in this situation compromised the full participation of the learners in the role play. African norms constrained the child's freedom to express the features of a person suffering from diarrhoea. (FN, 02/07/10).

On the issue of structural dimension the teacher said she did not manage to buy all the fruits and samples of foods she wanted to use during the lesson (FN, 02/07/10). Besides this the lesson was easy to implement as it did not require a lot of extra resources, and it could easily be done in the classroom.

A wider structural issue affecting the lesson was the context in which children grow up, as it was not always easy to put theory into practice with regards to where they get their food from.

4.9. LESSON 4 IMPLEMENTATION: MUFULIRA BASIC SCHOOL

4.9.1. Category of new method and the complementary methods

The category of method used in this lesson was the 'Deliberative Teaching Methods' and the associated complementary method was the story method. Other methods that supported the lesson were:

- Question and answer method;
- Lecture method; and
- Discussion method.

4.9.2. Planning of lesson 4

This lesson, planned for a lower primary Grade 3 class was short and it took 30 minutes.

- ***General information*:** The lesson plan contained the following information: School: Mufulira basic School; Subject: *Icibemba*; Topic: *Insala Mu Mushi* (Hunger in the village) and soil erosion; Sub-topic*: Icalengele Insala* (The cause of hunger in the village); Date: 08/04/10; time: 09:00 hours; Duration: 30 minutes; Number of learners: 56' Sex: all girls: Grade: 3A.

- **General outcomes:** The teacher planned that by the end of the lesson learners should be able to plant trees to prevent soil erosion; and to explain how soil erosion influenced hunger in the village.
- **Specific outcomes:** The following specific outcomes were planned by the teacher. She anticipated that by the end of the lesson the learners should be able to: explain what causes soil erosion; explain why there was hunger in the village; and describe the remedy for the hunger in the village.
- **Introduction:** The teacher planned to introduce the lesson by informing the learners that she had a nice story to tell them. This was going to make them excited, and interested in hearing the story.
- **Lesson development:** The teacher planned to develop the lesson through the following activities:

  Activity 1: Inform the children about the topic and concept of the lesson

  Activity 2: Tell a story about hunger in the village

  Activity 3: Ask learners to write new words on the chalkboard

  Activity 4: Evaluate learners' work.

- **Conclusion:** The teacher planned to summarise the lesson with the main ideas of the story and relate it to environmental protection.
- **Evaluation:** The teacher planned to complete this after the lesson presentation.

4.9.3. Implementation of lesson 4

- **Introduction**

The teacher introduced the lesson by informing the learners that the subject was *Icibemba* (local language spoken in Northern Province of Zambia) and that the topic was about *Insala* (situation of hunger for days and weeks) and soil erosion. She told the learners that she had a nice story about what happened in one village where there was hunger.

- **Lesson development: Teacher's activities**

Teacher activity 1: The teacher explained that the lesson was about *Insala*. She told the learners to listen attentively to the events in the story.

Teacher activity 2: The teacher told the learners a story about hunger in a village. The main features of the story were: There was hunger in the village for many years; the villages failed

to identify the causes of hunger until a visitor came to the village from another village. The villagers, their chief, his advisors and witch finders could not find the answers to the problem. One day the visitor addressed the villagers and said he had realised that the cause of hunger in the village was the absence of trees in the village. The visitor explained that he had not seen any trees in their villages or surrounding area. He told the villagers that the only solution to the problem was for every villager to plant one tree the following day. The following day all the villagers woke up very early in the morning and each planted a tree. The result was the village had plenty of trees, and this was the end of hunger.

Teacher's activity 3: The teacher asked the learners to walk to the chalk board and write the following words in vernacular: *umumana* (river in Englishi) , *insala* (hunger in English), *umushili* (soil in English) , *imfula* (rain in English). She emphasised the correct spelling of the following words: *imfula, ifimuti, umushili, umumana*.

Teacher activity 4: The teacher asked learners about the importance and uses of trees, following the story.

- **Lesson Development: Learners' activities:**

Learners' activity 1: Learners listened attentively to the teacher, and showed some excitement about being told a story.

Learners' activity 2: Learners listened quietly and attentively to the story that the teacher told.

Learners' activity 3: Learners were invited one by one to the front of the class to attempt writing the words, using the correct spelling of the new vocabulary that the teacher had introduced them too.

Learners' activity 4: Learners answered the teachers' question as follows: for food; for furniture; for making houses; for preventing soil erosion; for making charcoal; for firewood. They mentioned the importance of trees.

- **Evaluation**

The teacher evaluated the lesson by asking the learners on the uses of trees and they answered as mentioned above. She also asked learners to reflect on the story in relation to events in their own town.

- **Homework**

The teacher gave learners the following two questions to complete for homework.

- *Write the words imfula (rain), umumana (river), umushili (soil) and ifimuti (trees).*
- *Draw people planting trees; and mention the means to prevent soil erosion.*

4.9.4. Knowledge generated during lesson 4

The knowledge generated during the lesson was that: cutting down trees without replanting causes poverty and hunger in a village. Deforestation prevents rainfall in a village; lack of rain causes hunger; trees that are cut can be replanted again; if drought was caused by deforestation, planting of trees can restore rainfall to a place.

The teacher did not make clear what the links between hunger, and deforestation were in the story, or how trees help to hold soil in place, and also enrich soil thus contributing to better soil for food production. Some of the knowledge assumptions were therefore not clearly explicated for the learners. There is also no evidence that deforestation prevents rainfall in a village, or that cutting down trees 'causes' poverty; it can exacerbate poverty and hunger, but not necessarily be the cause of such problems. The teacher also did not *discuss or deliberate* these issues with the learners, she simply asked them to name uses of trees.

4.9.5. Teacher's level of knowledge:

The level of the teacher's knowledge was good because she was conversant with the environmental content in the story, even though she did not bring it out explicitly for the learners, and some of the points made were not factually correct (e.g. lack of trees 'causing' poverty). The teacher was, however, able to relate the events in the story to what happens in the real life situation. She continuously evaluated the learners to check if they were able to match the events in the story to the environmental concerns of their town. The teacher did not, however, take the learners out to plant the tree as she planned in her lesson plan because the period for the Grade 3 class lasts for only 30 minutes. She also could have made more use of *deliberative methods* (i.e. getting the children to discuss different aspects of the story that were not so clear).

4.9.6. Teacher's reflections about lesson 4

In her reflective interview, the teacher said that the story method is a very good teaching method for lower grade classes like Grade 2 because they always are interested in listening

to ‘folk” stories from their parents. She also said that the method allowed the young learners to discover that in the story if all trees are cut down there can be no food in the village; soil erosion can take place; that trees help to hold soil together; that human beings can use trees in many ways such as food, shelter, carpentry, charcoal. The teacher said the story had characters and features which were used to integrate environmental issues into the subject of *Icibemba*. The teacher said she could not manage to plant the tree in the 30 minutes but that she would plant the trees in the next lesson (FN, 02/07/10).

4.9.7. Socio-cultural and structural dimensions in lesson 4

On cultural issues the teacher said that she had included the issues of culture in the lesson because she told learners that the villagers had consulted the witch finders and cultural diviners to find out if they could tell the villagers about the causes of the prolonged hunger in the village, but they also failed to provide a solution until a visitor in the village revealed that the causes were environmental problems of deforestation. Even though she had done this, the teacher reflected that she was not aware that the issue of consulting the diviners was a socio-cultural dimension of teaching, as she had not thought about it before teaching the lesson. The teacher said the other socio-cultural issue was the poverty that was experienced in the village. The teacher said that socio-cultural issues covered in the story method included: the aspect of consulting diviners, the lifestyle of tree cutting for various uses by the villagers; the attitude of the villagers towards the trees. The teacher reflected that she did not emphasise the socio-cultural and structural aspect of the lesson because it is a new concept for her in thinking about teaching methods.

The main structural issue influencing the lesson was that the class size was large (56 learners), which did not make it easy to give every learner a chance to write the words on the board. It was also not so easy to discuss the details of the story with all of the learners at the same time; hence the teacher asked a question that all could answer. There were no wall charts or pictures, or supplementary materials that could have extended the learning in the story, which is a structural constraint (i.e. lack of adequate learning materials).

4.10. REFLECTIONS ON THE LESSONS TAUGHT WITH NEW METHODS

4.10.1 General reflections on the four lessons

Lesson 1: As mentioned above, the teacher used the new Learning by Doing category of teaching method. Practical action taking was the supporting method. The nature of the category of the method compelled the teacher and the learners to put into action the planting of the tree. The teacher reflected that if she had not learnt about the new method she and the learners could not have planted the tree in the lesson. She reflected that the issues of the lifestyle of learners should be part of the teaching and learning processes to integrate socio-cultural dimensions into the lessons; an aspect she had not thought about before. She said socio-cultural and structural dimensions are omitted in teachers' meetings, workshops and pre-service and in-service training (FN, 06/04/10).

Lesson 2: As mentioned above, the teacher used the new Investigation category of methods, and the complementary methods of household interviews and fieldwork. The teacher said that the name of the new investigative teaching method inspired her and the learners to visit the two households and carry out the interviews in the field. The teacher went into the community in order to link school concepts with the reality of the learners' everyday life situation. The new method allowed learners to engage in team work, cooperative learning, social learning, sharing of ideas, and meaning making associated with environmental issues through mathematical concepts (FN, 07/04/10). The teacher found that this enhanced the relevance of the lesson and that learners enjoyed the lesson and learned more than the mathematics concepts that she would otherwise have taught using the lecture method.

Lesson 3: As mentioned above, the teacher used the category of Experiential methods and their complementary role play method. This allowed the learners at Grade 2 level to engage in higher levels of critical thinking and develop creativity; they were able to take responsibility for the roles in the play and apply knowledge in a new situation. This involved them in situated learning, group organisation, coordination, discussions and presentations. The teacher said socio-cultural and structural issues did not stand out in their lesson plans and need to be included in pre- and in-service teachers' training. The new methods allowed the learners to emotionally become involved in the learning process. She thought that teaching objectives should address socio-cultural and structural dimensions; and that this needs to be explored further in teacher education colleges (FN, 02/07/10).

Lesson 4: As mentioned above, the new category of Deliberative methods was used with its complementary method of storytelling. The teacher thought that this was appropriate for the Grade 3 class, which is at the lower primary level. Telling a story to children is great fun. The story had environmental features such as trees, rain, soil erosion and rivers. It also included a number of other socio-cultural issues such as poverty in the village, diviners, chief, attitude of villagers, and lifestyle of the villagers. The teacher reflected that lifestyles of the community are mentioned but not emphasised in lessons. She also noted that this feature of teaching and learning needs attention in colleges to improve the quality of education (FN, 08/04/10). The teacher's presentation was structurally constrained by non provision of wall pictures that could have added value to the lesson through providing visual teaching and learning aids which could also have addressed some of the conceptual issues identified in the lesson discussion above.

4.10.2 Teachers reflections on lessons taught with new methods

During the second reflection workshop each teacher was allowed to share with the other participants the following: School; subject taught; topic; subtopic; lesson objectives; environmental issues integrated into the lesson; new category of teaching methods used, complementary methods used; and challenges experienced.

As discussed in Section 4.3 above, teachers reflected that use of existing methods provided limited and narrow opportunities for pupils to learn new ideas, that they limited exploration of new ways of thinking and of answering questions; and that they limited exposure to the environment outside the class room. They also reduced interaction with fellow pupils and community; had no room for socio-cultural and structural dimensions to be brought out; and tended to make teaching and learning boring and rhetorical. They also contributed to a delinking of emotions from learning processes (FN, 10/08/10). As such the over-use of existing methods did not expand and offer quality environmental learning experiences. The reason for this is that historically teaching and education has been teacher centred (Freire, 1970) an approach to quality that was shaped by human capital orientations, as discussed in Chapter 2 (Carmody, 2004).

At the second workshop, teachers reflected that the new categories of teaching methods increased the pupils' opportunities to acquire new ideas and skills as they allowed for enquiry based learning; and action competence development in learners. They also said that

the new teaching methods allowed learners to use their emotions as part of learning; and that they helped to make learning fun and adventurous. They also said that the new methods helped to make learning more practical, and that helped learners to make meaning of the learning. They also said that the new methods helped to make learners more responsible for their learning and that they could apply the learning to the wider world and their lifestyles (as indicated in the homework activities in the lessons above). Teachers also said they felt more motivated, and that the lessons "motivates teachers and learners"; and "allows learners to share and learn in informal ways." The methods were also seen to be more participatory; and they had room for the socio-cultural and structural dimensions, which teachers said they had not thought a lot about before.

The teachers proposed that the two workshops should be organised for all teachers so that the new teaching methods permeate all teachers and schools. Teachers reflected that the two workshops have changed their perception and application of teaching methods. They felt that they were "re-trained" through the two workshops, and they especially appreciated being able to select new methods and plan the first lessons together (FN, 10/08/10).

4.12 CONCLUSION

This chapter has shown that the teachers' planning workshop revealed that teachers were using a limited and narrow range of teaching methods that did not improve quality of teaching and learning. Through exposure to materials that outlined new categories of teaching methods and a range of associated methods, and a process that allowed teachers to work together to plan lessons clearly together, teachers were given the 'space' to try out the use of new methods for environmental learning in the context of the different subjects that they teach. This was demonstrated through careful reporting of four lessons in some detail, including the planning, implementation and teachers' reflections on the lessons. Teachers reflected that the new methods allowed them to do things differently, and that there were many benefits for the learners and that the learning process was more interesting; and that socio-cultural aspects could be brought into teaching and learning. There were, however, some structural aspects influencing the lessons, which included teachers' knowledge of environmental concerns, learning and teaching materials, classroom size, and wider issues of poverty and choices available to learners. In the next chapter, I consider these lessons and the use of new teaching methods in more depth, drawing on the

theory of educational quality discussed in Chapter 2, and the modified Nikel and Lowe model that I used to analyse the quality dimensions of the lessons.

CHAPTER 5
QUALITY DIMENSIONS OBSERVED IN LESSONS USING NEW TEACHING METHODS

5.1 INTRODUCTION

This chapter discusses the quality dimensions that were observed in the lessons where new methods were used. The chapter aims at confirming whether there was any evidence of quality and relevance in environmental teaching and learning demonstrated by teachers when a wider range of new teaching methods were applied during the lessons. The chapter aims at revealing whether there was a balance in the quality dimensions identified by Nikel and Lowe (2010). The word "balance" is used to assess the presence of quality dimensions in the lessons, and ultimately to see whether the methods help learners to acquire knowledge, values and skills needed to respond to environmental issues, problems and hazards in an independent and democratic way.

As quality is notoriously difficult to 'measure' (see Chapter 2) I subjected each lesson (described in detail in Chapter 4) to a review using the Nikel and Lowe model of fabric of quality dimensions to find out if any of the dimensions or the balance of dimensions were present in the lesson (Nikel and Lowe, 2010). It is in this chapter where the research question, focussing on whether a wider range of preferred teaching methods contributes to the quality and relevance of environmental learning, is addressed. Chapter 4 revealed that teachers had observed that a limited range of teaching methods and over-use of rhetorical teaching styles do not contribute to quality environmental learning (Hart, Jickling & Kool , 1999). The question addressed in this chapter is whether the selected new methods (representing a wider range of teaching methods, *do* contribute to quality environmental learning, and if so how and why). As such, the chapter discusses the quality dimensions evident in the planning and implementation of the lessons. The chapter further discusses the evidence reflected in the teachers' post–lesson discussions and reflections about what they thought would be meaningful engagements with their own practice in the use of a wider range of new teaching methods for facilitating environmental learning.

At a broader level, this chapter asks a similar question to the one that Hart (1999) asked about education which asks “What does good education look like?” When paraphrased and related to this study, the same question in this research might be “What does good quality teaching look like, as influenced by methods?”

5.2 QUALITY DIMENSIONS AS OBSERVED IN THE FOUR LESSONS

5.2.1 Quality dimensions in lesson 1 (Learning by Doing-Practical Action Taking – tree planting)

- **Overview of quality dimensions**

The lesson was described in detail in Section 4.5. Here I reflect on it in more depth drawing on the quality dimensions described in Chapter 2, as represented in the quality analysis tool that I developed for the study, described in Chapter 3.

- *Effectiveness:* The lesson can be said to be effective because most of the lesson objectives were implemented as planned. The teacher also effectively made use of the textbook, and the practical tools needed to plant trees. However, it is not clear that the learners developed *investigative skills* despite this being a proposed objective of the lesson. As noted in Section 4.5.3 the teacher also did not correct learners when they said that deforestation *caused* climate change and poverty. These detracted from the lesson. Follow up during member checking showed that the tree had died, as the teacher did not allocate learners with the responsibilities of taking care of the tree. This shows the need for follow through when practical action methods are used.
- *Efficiency:* The lesson can be said to have been efficiently conducted, as the teacher implemented all the proposed activities in the lesson plan in good time, including the demonstration on how to plant a tree. The lesson also provided a learning situation in which learners were able to view, discuss and present issues concerning forests, deforestation, advantages and disadvantages of deforestation,and solutions to deforestation. They covered a lot of ground in the time allocated.
- *Equity:* The teacher was conscious of being gender sensitive in learners’ participation in the lesson, addressing equity. However, finer details of cognitive inclusivity at the level of all learners’ ability to comprehend and make meaning of the lesson was difficult to fully establish without examining assessment of written work at the end of the lesson.

- *Responsiveness:* Planting a tree was being responsive to the issue of deforestation and taught learners that they could be responsive to this issue through this practical action. Without using the practical action method, this would not have been possible. In this way *the choice of method* enhanced responsiveness of the lesson.
- *Reflexivity:* This was not fully covered by the teacher in the context of the lesson planning and implementation as the teacher did not fully assess if all of the objectives of the lesson had been achieved. At another level, however, the teacher was able to, in later reflections which were facilitated through the research and the second workshop, reflect more critically on the use of the method, when she said that she had not thought about including socio-cultural dimensions of deforestation, and links to the lifestyles of Zambian people, who relied heavily on trees for charcoal as a primary energy source.
- *Relevance:* The reasons given by learners for not cutting down trees showed relevance of the concept. The practical action was relevant to the prevention of deforestation. With more attention to the socio-cultural aspect (the lifestyles of Zambian people), the lesson could have been more relevant to the societal context.
- *Sustainability:* Sustainability was addressed in the lesson through the activity stating the reasons why people cut down trees and through the response of using a practical action to plant trees. This was despite the fact that the teacher mentioned that she had little understanding of sustainability. Follow up at the school at a later date, during member checking, however, showed that the tree had died as the teacher had not allocated learners with responsibilities to take care of the tree (FN, 30/07/10).
- *Socio-cultural:* Socio-cultural aspects were dealt with through the activity focussing on stating the reasons why people cut down trees. However, this was not taken further into a discussion on the lifestyles of people, and *why* deforestation was an issue (i.e. over-reliance on trees for charcoal as an energy source), and what the alternatives to this might be (e.g. sun stoves).
- *Structural:* These aspects of the lesson were well dealt with, considering that the lesson was completed in the planned time. The size of the class was large, there were 45 learners in the class, which affected every learners' chance to actively participate in the planting of a tree. Only some learners got a chance. Planting more than one tree, and dividing the class into 'tree planting groups' could have dealt with this problem. However, the teacher did not have enough time and money to organise more trees to

plant with learners. It is possible, however, that she could have consulted with the local forestry officer who may have been able to assist.

Table 5.1 summarises the evidence of quality as revealed in lesson 1. The table shows that not all dimensions of quality were obtained, although most were fully or partially attained.

Table 5.1: Summary of dimensions of quality evident in lesson 1

Nikel and Lowe (2010) dimensions of quality								Southern African dimensions	
Effectiveness	Efficiency	Equity	Responsiveness	Reflexivity	Relevance	Sustainability		Socio-cultural	Structural
√ / X	√	√	√	X / √	√	X		√ / X	√ / X
Objectives achieved, but not the investigative skills objective. Teacher did not challenge learners when concepts were not completely correct.	All steps followed; lesson completed in good time	Teacher gender sensitive	Responded by planting one tree	Teacher did not ensure that learners became responsible for the planted tree. Teacher did not review if all objectives had been met, but did show some capacity for reflecting on the lesson afterwards.	In groups learners gave reasons for uses of trees and learned how to plant a tree to respond to the issue.	While aspects of sustainability were discussed in the lesson, member checking and triangulation of the planted tree revealed that tree had died.		Discussed reasons for uses of forests in the village but did not relate to the lifestyles of Zambians (and energy related issues)	Pupils sat in groups; more trees could have been obtained to give more learners a chance to participate in the practical action activity.

- **Discussion of the balance in the fabric of quality dimension in lesson 1**

As noted in Chapter 2, Nikel and Lowe (2010) emphasise the notion of 'balance' of these different quality criteria through their concept of a 'fabric' of educational quality. As shown in the discussion above, the teacher successfully (at least to a large extent) used the new teaching method of Learning by Doing and the complementary method of Practical Action taking. The teaching materials, teacher's activities and learners' activities were all implemented successfully; with some caveats (such as the need to correct misunderstandings of learners, and follow through after the activity to ensure sustainability). A number of quality dimensions were achieved or partially achieved addressing a number of the dimensions of the Nikel and Lowe model. Reflexivity and sustainability dimensions appeared to require the most attention. Other elements which also needed further attention were effectiveness, socio-cultural and structural aspects of the lessons as shown in Table 5.1 above. In line with Nikel and Lowe (2010) balancing of the dimensions does not necessarily mean implementing all the dimensions of educational quality at once, but rather that important dimensions aimed at bringing about change need to be present, such as sustainability in this case (Nikel & Lowe, 2010).

From a 'new methods' and perspective, it was interesting to see that sustainability, effectiveness, structural aspects and responsiveness were closely related to the specific method of practical action. Without follow through (giving learners responsibilities to take care of the tree afterwards), sustainability and effectiveness of the lesson was compromised as the tree died, reducing the value of the lesson. Without using practical action as a method, the lesson could not have been responsive in a practical sense to the issue being discussed. More trees were needed to deal with the structural constraint of many learners, all needing to have a practical chance to participate in planting the tree.

From an environmental learning perspective, Hart (1999) and Rosenberg (2007) state that teachers need to use learner-centred teaching methods such as Learning by Doing to add quality and relevance to environmental learning; but as shown in this lesson, this requires teachers to give attention to the quality dimensions in the context of the method. Rosenberg (2007) describes Learning by Doing as learners taking action to address a practical need in a local context, and viewing the process as an educational opportunity. In this lesson, attending to structural factors, sustainability, effectiveness and socio-cultural aspects seemed to be important in ensuring that use of such methods contributes more

fully to educational quality. Using a new method *per se,* does not therefore necessarily contribute fully to educational quality, even though there is evidence that the new method did change the way that the teacher had been teaching before, and that the lesson was more learner centred which in itself can be said to enhance the quality of environmental learning (Hart 1999).

5.2.2 Quality dimensions in lesson 2 (Investigative Methods using Household Interviews and Fieldwork)

- **General overview of quality dimensions in lesson 2**

This lesson is described in detail in Section 4.6 in Chapter 4. Here the quality dimensions of the lesson are analysed and reflected on, in a similar manner to lesson 1's analysis in Section 5.2.1 above.

Effectiveness: The lesson could be said to be effective as the lesson introduction was linked to lesson implementation; lesson objectives were successfully achieved, the teacher linked the prior knowledge of learners to the household interview questions and the mathematics task; learners were organised into groups to interview community members giving more learners a chance to fully participate in the activity; and mathematical knowledge was developed from and contextualised within environmental issues in community life in a way that enriched mathematical learning and helped to ensure that the concepts were successfully acquired.

Efficiency: Teacher's and learners' activities show that the lesson was implemented as planned in the time allocated; and learners were able to develop and apply mathematical concepts from everyday life situations. The efficiency of the lesson was improved through the prior planning and organisation of the teacher who arranged the fieldwork in advance, and developed the worksheet for the learners.

Equity: In this lesson, community members' knowledge was equated with the teacher's and was seen as an equally valid source of knowledge. The teacher was gender sensitive in the way that she allocated group tasks. Use of the local language allowed this language to obtain equal status to English as a medium of education and communication during interviews.

*Responsiveness:*The teacher gave learners homework that encouraged them to go home and repeat the same activity of interviewing friends in the neighbourhood and developing relevant mathematical knowledge in and for their social context.

Sustainability: Sustainability issues were included in discussions on the importance of growing indigenous crops that were scarce in the area, and in discussions on how to manage waste, particularly waste that was not biodegradable.

Socio-cultural: The lesson worked with socio-cultural features of the context, as it included local knowledge of communities, and learners' interviews with household owners in the community. The knowledge generated was about the crops they grew and animals they kept and the reasons for such activities, and also how they did these in sustainable ways. Other important socio-cultural features involved the manner in which the teacher greeted the house owner before interviews; and through using local language in the fieldwork exercise, the use of which allowed integration of African norms into the mathematics lesson. The teacher was well prepared for the lesson.

Structural: Structural dimensions of the lesson included teacher's pre-arranged interview with house owners. This was important because there is a cultural belief (cultures are also seen as structures) in Zambia not to give household information to people who are not a relation. The teacher therefore played an important role in negotiating permission for learners to discuss the sources of livelihood and household practices which are a matter of privacy in the private homes. Use of group work during the interview process helped the teacher to manage the large class size. The teacher was very well prepared for the lesson and was able to make good use of the learning support materials (particularly the chalk board) to help learners translate the fieldtrip data into mathematical data and concepts.

Table 5.2: Summary of dimensions of quality evident in lesson 2.

Nikel and Lowe (2010) dimensions of quality								Southern African dimensions	
Effectiveness	Efficiency	Equity	Responsiveness	Reflexivity	Relevance	Sustainability		Socio-cultural	Structural
√	√	√	√	√	√	√		√	√
All objectives achieved;	All steps followed and	Gender sensitive, reduced	Had relevance to own life	Planned lesson with	Use of community as guest	Discussed with each house		Discussed with house owners	Administrative permission

mathematical concepts successfully learned.	lesson completed successfully in time allocated	marginalisation of local knowledge, and recognised the value of other forms of knowledge (not just school knowledge, but also community knowledge).	conditions and mathematical knowledge could be applied in home context. Also referred to how learners can get rid of waste at their homes.	arrangements with community members; Teacher was able to reflect on how the method added value and new relevance to mathematics teaching (compared to previous methods used).	teachers; and using mathematical knowledge in ways that can be applied in other / home contexts	owner the concept with real examples		cultural aspect of garden, crops and animals domesticated; use of local language; negotiation of cultural beliefs (e.g. sharing of household knowledge with learners).	to do field work interviews and arrangements with community group work to give more learners a chance to participate.

- **Discussion of the balance of quality dimensions in lesson 2**

The new category of teaching methods and the complementary preferred methods used in lesson 2 captured all the dimensions of education quality in the Nikel and Lowe (2010) fabric model, and the two additional quality dimensions included from southern African literature (as discussed in Chapter 2). The category of investigative methods and complementary interview and field work methods allowed the teacher and the learners to become engaged in a wider range of learner-centred activities than would otherwise have been the case in the mathematics lesson (the teacher said she would have just used lecture method). Thus exposure to and use of a wider range of methods and activities provided for high quality teaching and learning in the lesson. Lesson 2 proved that preferred teaching methods work better than un-preferred teaching methods or teaching methods that are used without adequate thought (see Section 5.4.4). The new methods used in this lesson, allowed the learners to learn mathematics in a contextually situated manner allowing them to

synthesise contextual / everyday knowledge and abstract mathematical concepts in ways that were meaningful to them. There was action competence, deliberation, synthesis, application and analysis during teaching and learning.

This resonates with the findings of the international research programme on Educational Quality (discussed in Chapter 2) and the SADC REEP research on educational quality, which proposes that different dimensions of educational quality should be included in teaching and learning, including concepts of quality that allow for 'learning as connection'. Tikly and Barret (2009) argue that good quality education is inclusive, relevant, and democratic. Inclusive means that all learners have access to potential outcomes, and relevance means that learning processes and outcomes are meaningful to learners, and that these are valued by their communities, and that they are consistent with national development priorities in a changing global context. While this was only one lesson, it is possible to see that these dimensions of educational quality *can be* present in individual lessons.

From an environmental learning perspective, the methods used in lesson 2 are in line with the UNESCO's (2004) educational quality framework that explains that allowing learners to be involved in learning processes that involve interactions that combine indigenous, everyday and external elements and apply what they learn can contribute to educational quality. These objectives for learning are shared by the SADC REEP (Lotz-Sisitka 2008) in the southern African region and by UNESCO (2005) who argue that Education for Sustainable Development should be based on contextual relevance, and engage learners in cultural, economic, societal and environmental aspects of education. This type of learning can also develop attitudes that are free from discrimination, where all have equal opportunities to develop themselves, their families and their communities. (Tikly & Baret, 2009). Lesson 2 shows that this is more likely to be achieved if all elements of educational quality are present in lessons.

5.2.3 Quality dimensions in lesson 3 (Experiential Methods using Role Play)

- **General discussion on educational quality elements**

The lesson was described in detail in Section 4.7. Here I reflect on it in more depth drawing on the quality dimensions in a similar manner to the other two lessons discussed above.

Effectiveness: This lesson can be described as being effective, as the lesson was implemented as planned, the method was applied as planned, and learners enjoyed the

lesson and were able to achieve the intended outcomes which were appropriate for the level of the learners.

Efficiency: The lesson can be described as being efficient, as the role play was performed by learners within the planned time, and they easily followed what was required of them. The teacher guided them but did not have to spend a lot of time with additional explanations or disciplinary concerns.

Equity: The teacher was sensitive to gender by involving girls and boys, and giving them equal chances for participating in the role play.

Responsiveness: The lesson can be said to be responsive, as children in developing country contexts often suffer from diarrhoea, and the lesson was providing learners with strategies to respond to this issue. During the role play, learners were able to respond to the teacher's prompts, and took responsibilities for their roles in the play and responded to the demands of their roles to act for their own health in a healthy environment.

Reflexivity: The teacher was able to reflect on how this method had enhanced the children's learning, and also on how their participation in the learning process had increased because of the use of the method. Through the strategies and solutions modelled in the role play, learners were also given the knowledge to act reflexively if they were to experience diarrhoea in real life.

Relevance: The lesson can be said to be relevant as discussion on causes and prevention of diarrhoea and other diseases caused by lack of hygiene are relevant to all children, and particularly children who are exposed to environmental health risks (e.g. open food that is not covered properly in markets etc.).

Sustainability: The lesson did deal with some aspects of sustainability, by sharing rules of that could help to avoid serious diseases such as cholera outbreaks. The need to always wash hands before eating, and wash food before eating it, were some of the rules put forward.

Socio-cultural: The lesson included socio-cultural aspects, particularly a reminder to keep dwelling places clean, practise hygiene, and make sure food bought in open markets was washed before eating, pointed to the lifestyles, norms and culture of the community.

Structural: A reminder about overcrowding and adherence to hygienic rules were related to structural issues that often occur in contexts of poverty.

Table 5.3: Summary of dimensions of education quality evident in lesson 3

Nikel and Lowe (2010) dimensions of quality								Southern African dimensions	
Effectiveness	Efficiency	Equity	Responsiveness	Reflexivity	Relevance	Sustainability		Socio-cultural	Structural
√	√	√	√	√	√	√		√	√
All objectives achieved as planned	All steps occurred as planned	Equal chances of learning for both boys and girls	Referred to how learners can prevent diarrhoea through hygienic habits	Planned lesson with learners on how to demonstrate causes and solutions to diarrhoea, and was able to reflect on how the method had improved on previous practice.	Topic is relevant to young learners. Use of creativity in learners on how to demonstrate and role-play issues related to hygiene and diarrhoeal illness.	Discussed ways of making the environment hygienic and friendly to community to avoid incidences of diarrhoea; emphasis on environmental health		Culturally it is important to sweep the surroundings, keep domestic materials and bodies clean.	Group work and arrangement of class into groups. Did not require lots of additional teaching aids or materials.

- **Discussion of balance of quality dimensions in lesson 3:**

Use of this new category of teaching methods in lesson 3, as in lesson 2, showed that all dimensions of educational quality used to review the lessons can be present in the lessons, and that these elements help to ensure high quality lessons. The lesson also showed that the new method was, like in lesson 2, more learner centred, and learners were able to participate fully in the lesson, and they also enjoyed the learning. This was possible because experiential methods draw on learners' daily experiences of life, and expose them to new experiences, and involve multiple senses including what they know, see, hear, touch, smell and taste (Rosenberg 2007). Such methods have been widely used in environmental learning as they expose learners to a wider range of experiences in the environment (ibid).

In the case of this lesson, the teacher used the experiences of learners to depict a situation of a patient experiencing diarrhoea in a role play; and through this to expose them to new experiences, including solutions to the problem. The teacher reflected that the variety of activities during the role play added value to teaching and learning.

Lesson 3, as was the case in lesson 1 and 2, shows that choice of preferred method is an important aspect of pedagogy because the teacher becomes more interested in implementing the lesson more effectively.

5.2.4 Quality dimensions in lesson 4 (Deliberative Methods using the Story Method)

- **General discussion on educational quality elements**

The lesson was described in detail in Section 4.8. Here I reflect on it in more depth drawing on the quality dimensions in a similar manner to the other lesson discussions above.

Effectiveness: The lesson can be said to be to be partially effective as the teacher achieved some of the lesson objectives but not all. She had initially planned for the children to plant trees to prevent soil erosion but this did not happen. Also, the lesson was meant to be *deliberative,* but not much opportunity was created for learners to deliberate what was happening in the story, as they were asked only to answer one question from the teacher at the end of the story.

Efficiency: The lesson was partly efficient, as the story was a good method for conveying complex information in a short time. Learners paid maximum attention to understand the real picture of the story about the causes of poverty in the village.

Equity: Local language was used in the same way as the official language of instruction was used during the lesson.

Responsiveness: The teacher informed learners that the stranger and villagers had to plant trees as a response to the drought and hunger in the village thus giving them an understanding of how to respond to the problem of drought and hunger. However, the indirect link between planting trees and alleviating hunger was not clearly explicated; it would have been better to have told the learners more clearly that trees helped to maintain soil quality as they stopped run off and soil erosion, which in turn helped to ensure more sustainable food production. While the teacher planned to plant trees, this did not happen, thus reducing the real-life responsiveness of the lesson.

Reflexivity: The teacher told the learners that the villagers probed and inquired widely on the causes of poverty in the village. They enquired from the chief, diviner and amongst themselves.

Relevance: The teacher related the events of the story to the real situation in Zambia about the attitude of the people towards the forests. However, by not clearly showing the link between trees, soil erosion, hunger, and appropriate responses (planting trees), the relevance of the lesson, while being clear to the teacher, was perhaps not as clear to the learners.

Sustainability: The teacher told the learners that the planting of trees to stop hunger was an issue of sustainability, and that it was dealt with in the story when villagers planted the trees.

Socio-cultural: The story included socio-cultural aspects, such as cutting of trees by villagers; issues of hunger; and the role of chiefs and diviners as village consultants.

Structural: Structural features were dealt with in the sense that the story was seeking to model a response to aspects of poverty, and sought to model solutions through indicating in the story that there was agreement by villagers that each should plant a tree. The large size of the class, and time constraints influenced the deliberative nature (i.e. chances for learners to question and discuss in some detail interesting aspects of the story) and the practical aspect of planting a tree (which did not take place). Lack of learning support materials (e.g. charts or pictures) also constrained the lesson as they may have helped to make the conceptual aspects of the story clearer to learners; namely, the link between loss of trees, soil erosion, hunger, and how to respond.

Table 5.4: Summary of dimensions of quality education evident in lesson 4

Nikel and Lowe (2010) dimensions of quality								Southern African dimensions	
Effectiveness	Efficiency	Equity	Responsiveness	Reflexivity	Relevance	Sustainability		Socio-cultural	Structural
X/√	√/X	√	√/X	X/√	√/X	√/X		√	√/X
Did not achieve all lesson objectives; objectives	Matched events in story to daily	In story every person in village planted	Planting of tree was a response to drought and hunger in the	The teacher's reflection on the	Discussion on causes of drought and	Planting of trees in the village to eradicate hunger		Cutting down of trees by people was a social-	The large class size prevented involving learners in

only partially achieved.	life very well; but time allocated for intended activities was not enough	one tree; language used in the lesson included home language and official educational language equally	village; but the actual non-planting of the tree decreased real life responsiveness.	content of the lesson was clearer *after* the lesson, than during the lesson. She was also reflexively aware of what she was able to do and not do in the lesson.	hunger was relevant; but the lack of conceptual clarity in the teaching of the lesson affected the relevance of the lesson.	was a sustainable action; but this element was reduced by not planting the tree.		cultural phenomenon, and is linked to the need for energy resources; Village structures exist to help respond to issues.	deliberations without organising them into groups. Lack of additional teaching materials influenced the teaching of the story.

- **Discussion of balance of quality dimensions in lesson 4**

This lesson, similar to lesson 1 showed that many of the quality dimensions were only partially achieved in the lesson. This was due (as in the first lesson) to clarity of teacher's knowledge and teacher's abilities to clarify concepts well to learners and to some aspects associated with the actual method. For example, deliberative methods work better if adequate opportunities are created for learners to engage in critical discussions based on the story that is presented (not just answer questions from the teacher). However, the deliberative teaching method and its complementary story method provided an opportunity for especially bringing out the socio-cultural aspects of quality, as well as equity aspects of learning. The method, however, fell short in terms of its responsiveness, particularly since the teacher was not able to combine it with the practical action of tree planting (as intended). This lesson also shows that if dimensions (e.g. the structural dimensions) are not adequately addressed, they affect other dimensions (e.g. the responsiveness dimension); or if the effectiveness dimension is not addressed well (through quality of knowledge or timing

etc.), then other aspects such as relevance are influenced. This helps to show why Nikel and Lowe (1999) talk about a 'fabric' of quality where all aspects of quality are related. Because the dimensions are inter-related, depend on, and support each other the education quality of teaching and learning as a whole is influenced by the success or partial achievement of one or more of the dimensions. However, despite these comments, the story telling method was seen to be a successful method for teaching lower primary learners by the teacher. She also reflected that this is a 'legendary' method of teaching, and that it worked in indigenous knowledge systems and was a good method for integrating environmental learning concepts into language, as was demonstrated in her lesson. She felt that use of this method had improved her practice, and learners' participation, thus contributing to educational quality.

5.3 DISCUSSION OF THE QUALITY DIMENSIONS ACROSS THE FOUR LESSONS

The discussions of the balancing of dimensions of the four lessons show the following important findings from this study: The first is that the use of a wider range of preferred teaching methods can improve the quality and relevance of environmental learning; but that attainment of all dimensions of quality within lessons, further enhances the quality of teaching and learning. The second finding is that focussing on socio-cultural and structural dimensions in addition to the Nikel and Lowe dimensions is important for contextualisation of quality into the Southern African region. The third finding is that teachers should have a choice, and should use preferred teaching methods, as these can stimulate new ways of teaching that help to attain the quality of learning preferred. The fourth finding is that the preferred chosen teaching methods that are aligned with, or developed out of the field of environmental education (Rosenberg 2007) can yield improved quality of environmental learning in ways that strengthen learner centredness and action taking, deliberation, experiential learning and investigation amongst learners; all of which are important for environmental learning processes. Working with these four categories of methods to support teachers to identify preferred methods that they can use in the context of their subjects seems to be a possible strategy to support improved quality of education (generally), but also improved quality of environmental learning in different subject contexts. The fifth is that teachers should use teaching methods that can invite into the lesson other complementary teaching methods as demonstrated in lessons 1 to 4; none of the methods were isolated, but were used in combination with other methods, including

the tried and tested ones. However, as shown in lesson 4, it is necessary to fully understand the implications of the new methods (e.g. the teacher could have given learners more time to deliberate aspects of the story, rather than just answer a question she posed).

Overall, the four lessons, and the teachers' reflections (which included reflections on using the new preferred methods in the other lesson contexts that were not reported on in Chapter 4) showed that use of new categories and a wider range of teaching methods improved both the education quality of environmental learning and education, but that there were, as shown in lesson 1 and 4 elements in the lessons that could reduce the full potential of achieving high quality.

The improvement of education quality as observed in this study was made possible because a wider range of teaching methods provides an increased number of avenues of learning for learning to know about a concept in a lesson (Barret et al., 2007). The discussions above, and the lessons and reflections described in Chapter 4, indicate that a wider range of methods provide the learners with opportunity to engage with activities that link school knowledge with community life. This link also helps to potentially improve the quality of life and makes learning relevant. Teachers reflected that use of a wider range of preferred teaching methods improved education quality (TR 1-9; FN, 10/08/10). They said that, after their experience of trying out the methods, they had found that there was more value and meaning to the process of planning and implementation of environmental learning and integration of environmental issues into the subject learning areas such as Mathematics, Zambian Languages (*Icibemba*), Social Studies, Science and other subjects (Hart, Jickling & Kool, 1999).

Lesson observations and post-lesson reflections also revealed that, at times, teachers were able to implement some of the quality dimensions without being aware that they were doing this. This phenomenon was observed in relation to both the Nikel and Lowe (2010) and the southern African dimensions used as lenses to interpret educational quality in this study. This was confirmed during the post-lesson interviews with teachers (FN, 07/04/10). The dimensions that were 'tacitly' covered included that of sustainability, reflexivity, and socio-cultural and structural dimensions. Dimensions which were more explicitly dealt with by teachers included equity, responsiveness, relevance, efficiency and effectiveness. This may be because these are more explicit in teacher education discourses; for example,

teachers are always taught that they ought to achieve their lesson objectives, and that lessons should be carefully timed etc.

When discussing some of these quality dimensions with teachers during reflective interviews, all teachers noted that teachers should receive more education on sustainability issues, and on the socio-cultural dimensions of teaching, as they could see the value of these, but were unsure of what was meant by these as 'quality dimensions'. Thus, making these quality dimensions more explicit could assist with teachers reflexivity. It is critical for teachers' pedagogical practice. If teachers are inadequately oriented to these important aspects of their teaching practice; or if they are not aware of these dimensions that contribute to educational quality, then the dimension would be 'dysfunctional' in the effort to achieve educational quality, and would not help to improve the intended quality of education because the dimensions act as a fabric in tension, as explained by Nikel and Lowe (2010) and as shown in four lessons analysed in this study. Nsubuga (2008) has reported that many teachers in southern Africa either demonstrate ignorance of pedagogic practices and concepts, or have superficial or outdated perspectives on pedagogical practices (Nsubunga, 2008). In this study, teachers in the first workshop, reflected on the limited scope of their pedagogical practices, and were able to expand their knowledge of these practices through their participation in this research process.

The next section summarises the main findings of the study, and provides recommendations.

5.4. SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

5.4.1 Analytical statement 1

Use of a wider range of preferred teaching methods engages the learners in increased number of learners' activities, which expands the dimensions of quality

The use of a wider range of a new category of teaching methods by teachers in integrating environmental learning in core subjects increased the number of learners' activities in which the learners were engaged during the lesson. The increase in the number of learners' activities increased the number of chances for learners to learn. This is in line with research findings by Rusbult (2007) who stated that there are several advantages of using a wider range of teaching methods thus: The first advantage is that use of a wider range of teaching methods would cater for multiple learning styles and help students retain information and

strengthen understanding. The second advantage is that it ensures that all students have equal opportunities to learn. The third advantage is that it caters for both slow and fast learners. The fourth advantage is that it develops the ability to engage in thought provoking learning processes and supports the learners to become not only critical thinkers but also to become responsible for their learning (as shown in the four lessons). The fifth advantage is it increases interest in learners, which was also shown in the four lessons. All these advantages improve the quality of education (Rusbult, 2007), and the quality of environmental learning (Rosenberg, 2007). This is supported by Barret et al. (2008) who state that quality learning comes when the teacher meets diverse learners' needs through the provision of learner-centred pedagogies.

Recommendation: Teachers should use more than one teaching method, and develop the skills to select methods that are more learner centred, and use these as the 'main method' during a lesson to improve the quality of environmental learning to achieve a balanced and stretched 'fabric' that includes all or most of the quality dimensions of education identified in this study. The use of new teaching methods, as shown in this study, has the potential to engage learners in inclusive, relevant and democratic quality dimensions of education (Barret et al., 2007). Teachers should not confine learners to theoretical concepts when deriving a concept, but as in the mathematics lesson in this study (lesson 2) should integrate everyday life phenomena such as crops, animals and waste, which are well known issues to learners, to work out and grasp more complex and abstract concepts such as sets, intersection and union.

5.4.2 Analytical statement 2

Support to teachers in form of training in pedagogy is critical for expanding the range of methods that contributes to quality

As shown in this study, it is necessary to support teachers with the pedagogical knowledge and skills and to make them understand that a wider range of teaching methods exist. The strategy of using 'categories of methods' (Rosenberg et al., 2005; Rosenberg, 2005) and associated methods helps teachers to understand the potential of different methods, but this needs to be fully understood (as seen in the case of the deliberative method used in lesson 4). The strategy of allowing teachers to choose preferred categories of methods and

associated 'companion' methods was also successful in enhancing teachers' pedagogical knowledge, and their practices in using a wider range of methods to improve quality.

The study has revealed that there are several good teaching practices that teachers implement while teaching their lessons without being aware of their pedagogic implications. Teachers need support in developing new pedagogical knowledge and skills because if they lack in this aspect their teaching either becomes 'static' and boring (as was noted in the first workshop), or it becomes less effective than it could be (as was shown by the mathematics lesson which became more effective through the use of a wider range of methods to teach sets than the lecture method).

Additionally, teachers need support in environmental education and education for sustainable development to strengthen their understandings of sustainability issues, and the contextualisation of learning through their teaching practice and praxis. Teachers reflected that they had inadequate knowledge about new categories of teaching methods and dimensions of education quality (FN, 07/04/10; 20/07/10). The need to support teachers in southern Africa with enhancing pedagogical practices is raised by Rosenberg (2008) who showed that there was a great need to support teachers in areas of methods to integrate environmental issues into core subjects to improve the quality of environmental learning. She argues that there is a need to provide refresher courses for the teachers who were trained before new teaching innovations were introduced. She also argues that improving teachers' levels of knowledge can prevent under-teaching and misrepresentation of the scope and depth of learning (Rosenberg, 2008:14). This was shown in the lessons described in this study where it became clear how teachers' knowledge affects the quality of the lessons. This is applicable to lecturers in Colleges of Education because they too, need support in pedagogic training (Zambia. METNR, 1985; 1994). Moose's (2009) study in a Teacher Education College in Zambia showed that the college lecturers' knowledge and pedagogical expertise influences teachers' knowledge and expertise.

Recommendation: The Ministry of Education and other relevant stakeholders (e.g. development agencies) should conduct workshops on new teaching methods. The ministry of Education should review the teacher education curriculum in Colleges of Education to include topics that focus on the dimensions of education quality in teaching methods to improve the quality of education more broadly, but also to improve the quality of environmental learning and education. This is necessary because many teachers have not

gone for training since they left pre-service training and have forgotten the skills of teaching, which was also a finding of the international EdQual research project (Barret, 2007). Another reason why teachers need support is because the study had found that some teachers lacked knowledge of environmental education and the skill to plan lessons that integrate environmental issues into core subjects. It is recommended that the Nikel and Lowe and the southern African dimensions of quality (as tested out in this study) be integrated into the teaching practice lesson observations of College Lecturers to improve quality of teaching. In this study, this tool provided me (a College Lecturer) with a tool to improve my observations of teaching practice; and it also provided me with a tool to reflect on the quality of the lessons with teachers.

5.4.3 Analytical statement 3

Skill of integrating environmental issues into the core subjects of the syllabus during lesson planning and implementation needs to be developed for quality education to emerge

The four lessons included in this study show that including a focus on environmental topics in 'ordinary' subject teaching such as mathematics, languages, social studies and science can improve the quality of education, as the environmental focus brings aspects of relevance, responsiveness, socio-cultural, and sustainability dimensions to the fore. However, as stated by teachers in this study, they felt under-equipped to integrate environmental education into core subjects and most teachers view environmental education as the same as environmental science (FG 1 and2, 29/03/10; FN, 10/08/10; Ketlhoilwe, 2008). In all of the lessons the quality of teachers' environmental knowledge was significant. Additionally, integration of environmental knowledge in core subjects (as shown in this study) has potential to improve not only the quality of learning in classrooms, as it strengthens learners active participation via the wider range of more learner-centred methods, but because it also contributes to improvement of environmental management and action competence that can improve health conditions in a local community (as shown by the lessons in this study). This enhances the relevance of education, and the life skills of learners, which is an objective of the Zambian curriculum. Effective integration of environmental issues demands that teachers should first become knowledgeable and well trained. Barret et al. (2007) explained that integration of environmental issues and other subjects into core subjects

weakens the boundaries among core subjects so that learners understand issues of the physical world to be related to one environment, and while this is important in terms of holistic education, it can potentially also lower the quality of education if the subject contents are lost in the process. However, as shown in this study, teachers were able to keep their subject content in focus, while also integrating environmental knowledge, but it was clear in two of the cases, that teachers required further environmental knowledge to respond to misunderstandings of learners related to environmental content.

Recommendation: The Ministry of Education and associated stakeholders (including Teacher Education Colleges) should provide training for teachers on environmental education/ESD and how it can be integrated into core subjects. This should include a focus on environmental content knowledge, so that teachers can correct misunderstandings associated with environmental topics (e.g. that climate change is caused by poverty).

5.4.4 Analytical statement 4

Use of preferred teaching methods can be expanded through professional development

The study has shown that using preferred teaching methods means having to choose a method that is more suitable than another one in order to produce the required results of teaching a lesson. In this study, the teachers used the methods they chose from among others for various reasons, and they were afforded the opportunity to firstly understand the available range of methods, and then to select those that they preferred (through the use of methods, texts, and deliberations in the first workshop). The preferred methods were, however, chosen after critical reflection on use of existing methods as explained in Section 4.2. The study has shown that if preferred methods are used, the attainment of required quality is likely to be realised in environmental learning. The study has also shown that critical reflection on the use of these methods is important.

Teachers said that (before the workshop) they were using the same type of teaching methods because they did not have a wider range of teaching methods from which they could choose their preferred methods (FG 1 and 2). They reported that it was not easy to choose a preferred teaching method because they only knew about a limited number. The structural conditions under which they worked such as over-enrolled classes and lack of teaching materials further reduced their chances of choosing or using a preferred teaching method successfully (Hoabes, 2004; Moose, 2009). The lessons in this study did show that

structural factors *do* affect the successful use of the methods, but also that through careful planning (e.g. use of group work) some of these issues can be overcome. Lesson 2 (see section 5.2) in particular, showed that when a teacher uses a preferred teaching method, there are positive results that can emerge from the lesson.

Teachers noted that the use of un-preferred teaching methods reduced the education quality of teaching and environmental learning because the methods that teachers were often 'told' to use, were not their choice (FG 1). This finding is supported by Barret (2009) who said that teachers' motivation, and well planned and structured lesson plans improve the quality of education and, by implication the quality of environmental learning too**.**

Recommendation: The study recommends that teachers be afforded opportunities to, and be empowered with knowledge and skills about a wide range of teaching methods and skill of improvisation so that they can have a choice to make as a preference. This will avoid them becoming limited in their choice of teaching methods. As shown in this study, preferred methods choices using a wider range of methods, can improve quality of education and environmental learning because teachers are clear about the purpose of their lessons, and hence plan carefully for the lessons.

5.4.5 Analytical Statement 5

It is important to recognise teachers' own reflective practice and recommendations in developing quality

As shown in this study, affording the teachers with the opportunity to reflect on firstly the most widely used methods (reported in Section 5.2) and after the teaching of the lessons, and again in the second workshop was a valuable exercise in the process of working towards improved quality using preferred new teaching methods. Without reflecting on their current dominant practices, the teachers would not have seen the validity of a wider range of methods; and without reflecting on the use of the methods, the teachers would not have become more conscious of the way in which the new methods improved the quality of their teaching, and the learning experiences of the learners. This study showed that the teachers had the competence to engage in such reflections, if given the chance to do so. Without including such reflections, the use of new methods can simply become an imposition which may not have the teachers' support. The UNESCO Global Monitoring Report (2005) notes that quality is improved if the students and teachers have their inputs included in the

curriculum, and that this can take the form of post-lesson reflections or lesson evaluations. Teachers in this study, however, said that lesson evaluation has lost the value that it originally served in teaching such that it is now written as one statement as 'lesson was successful", without further elaboration. Using the quality dimensions as in the case of this study, provides a different tool for reflecting on lessons that can help to restore the value of evaluations (T2, 4 & 5).

Recommendation: Teachers should take post-lesson peer interviews, discussions and reviews seriously. Such practices should be developed as part of professional ethics by which they can improve their teaching practice. This requires professional commitment and dedication, and useful tools for reflection (such as the quality dimensions model used in this study).

5.4.6 Analytical Statement 6

Structural and socio-cultural dimensions of quality complement other dimensions of quality, and provide useful insights into quality education in southern Africa.

Although the seven dimensions of the Nikel and Lowe (2009) fabric model exist and have emerged from international research into educational quality; this study put forward a reasoned argument in Chapter 2 for expanding these to include socio-cultural and structural dimensions of education quality. The first reason is that the socio-cultural and structural dimensions help to bring out regional aspects of life such as the customs, life styles, and values that characterise the society in which education is taking place and thus add meaning to the education, and facilitate 'learning as connection' (Janse van Rensburg & Lotz-Sisitka, 2000; Wood, 1998; Namafe, 2008; Lotz-Sisitka, 2011). Socio-cultural factors include anything within the context of southern African society that has potential to affect teaching and learning. As shown in this study this could include cultural norms; language; societal practices; and important knowledge, which would otherwise be marginalised in the teaching and learning setting.

Structural dimensions, are equally significant to consider in attaining educational quality, and these include teacher-pupil ratios, class size, teachers' qualifications, the physical environment, nutritional level, and socio-economic status (amongst others). As shown in this study, structural factors such as large class sizes, or inadequate teaching and learning materials can affect the quality of the teaching and learning.

This study has also shown that there is value in including these two dimensions in observing quality teaching and learning in the southern African context. Inclusion of these features into the 'fabric' quality model will also resonate with what Tikly and Barret (2009: 4, 16) argue for, when they explain that efficiency and human rights–based approaches to quality can construct schools which are set apart from the local context. Through these approaches to quality, schools are ascribed an insulating role for providing effective, safe and gender-sensitive learning environments (ibid). They, together with southern African researchers (Lotz-Sisitka, 2008; Hogan, 2008; Namafe, 2008; Ketlhoilwe, 2008) argue that although children in schools should take for granted support and freedom to facilitate learning in schools, it should also be recognised that schools exist in specific socio-cultural contexts and quality education must be responsive to the lived realities of learners and educators in those contexts. Hogan's (2008) and Namafe's (2008) research show that this is an important epistemological question, and Lotz-Sisitka (2011) working with colleagues in the SADC REEP Educational Quality research programme, argue that this is also a pedagogical issue which involves meaning making and 'learning through connection'. Tikly and Barret (2009:16) have explained that human rights approaches are an entitlement related to cultural rights and therefore require that quality education meets learners' needs including those stemming from their various cultural identities; but experience in southern Africa is that such cultural identity perspectives are most often marginalised in modern education discourses (Namafe, 2008; Hogan, 2008). This adds to the argument put forward here to include these dimensions more explicitly in quality education research.

This study has also shown that although several teaching methods are used in teaching and learning quality is not realized if the combination of the different frameworks of quality dimensions is not included in the planning, implementation and in teachers' reflections on the lessons taught. In this study, teachers reflected on the importance of including socio-cultural and structural dimensions into quality discussions, and indicated that this was not a common practice, and that such factors should be included in teacher education.

This has implications for the way in which (as discussed in Section 1.2) the intersection of the three broad orientations to education quality being re-framed and developed in the SADC REEP (see Chapter 1, Figure 1.1) can come together at a practical level. The argument being put forward in the SADC REEP is that all the education quality orientations should come together to improve educational quality, but there was little guidance on how this can

be done at a practical level. This study has provided some tools and approaches for doing this.

Recommendation: Teachers and teacher educators working on issues of educational quality can usefully complement the Nikel and Lowe (2010) quality 'fabric' dimensions with the socio-cultural and structural quality dimensions identified as being significant to educational quality discussions in this region. As explained in Chapter 1, human capital approaches emergent from the colonial legacy have been adopted in Zambia, and more widely in southern Africa; and these quality dimensions have, therefore not been included in education discourse for a long time. It has been noted by many that education in African countries has little relevance to the realities of the African child (see Chapter 2). The consequences of this are that the dimensions that are used to develop quality in teaching and learning processes are not part of the African child's identity and life experience. This makes learning of the subjects such as mathematics, science, history, and social studies 'foreign' and 'challenging' for the African child. For example, in Zambia, use of the English language as a tool for selecting candidates to enter university and college represents neglect of socio-cultural and structural considerations in determining educational quality, because on the one hand, socio-culturally the English language is a 'foreign' and often unfamiliar cultural tool and on the other hand, structurally, it is taught by Zambians whose first language is not English. This serves to disadvantage the African child in significant ways, and highlights why these quality criteria are important to consider in educational quality discussions *in addition to* other quality criteria such as effectiveness and efficiency.

5.4.7 Analytical Statement 7

The quality model expanded from the Nikel and Lowe (2010) model used in this study can be used at different levels in the education system to improve the quality of pedagogy

As shown in this study (albeit only in a few lessons), the model developed to comment on, and develop educational quality can be used at different levels in the schooling system to improve quality of education, and environmental learning and that of general education at different levels of the education system. The study showed that the tool was equally valuable for lessons with Grade 6 learners, and lessons with lower primary learners. It is also possible that the same model can be used at teacher education level, the curriculum level in

colleges of education and university and can also be used to inform teaching practice at all levels.

Recommendation: The quality model, as developed for and tested in this small scale study can be used more broadly in a range of different teaching and learning settings. This would be an important area for further research. Such research can, for example, be done to see how the model can be used as a professional development and observation instrument for teaching practice in Teacher Education Colleges; or by District Education officers to use the model in primary school in-service teacher education programmes, in teacher group meetings and in programmes focussing on continuous professional development (CPD) for schools.

5.4.8 Analytical statement 8

There is an important relationship between expanding the range of teaching methods used by teachers, and using the quality dimensions to improve quality.

The use of the fabric of quality dimensions model together with a wider range of preferred teaching methods is a very important pre-requisite in the process of improving the quality of relevance learning, and of environmental learning, as shown in this study. This was particularly evident in the lesson on common diseases that was taught at Mufulira Primary School to the lower Grade 2 class. It was evident that if the teacher was not aware of the fabric of quality dimensions the use of a wider range of teaching methods was not as effective as when the teacher was knowledgeable about these dimensions. There was effective delivery of both quality and relevance of environmental learning each time a teacher combined possession of both the knowledge about the new teaching method and the aspect of dimensions of quality of education. The combination of the two is very important in the delivery of quality and relevant environmental learning. As a Biology lecturer I have likened the combination of the two simultaneously to the functioning of the phloem tubes and the companion cells of vascular tissue that transports plant food in the stem of a plant, which I have called a 'Phloem analogy'.

- ***Explanation of the EdQual Phloem analogy***

This analogy is an important model of the inseparable relationship between the use of the wider range of teaching methods and the fabric dimensions of education quality model to improving of educational quality and particularly the quality of environmental learning in

schools. The model formulated in this study suggests that it is not enough to only use a wider range of teaching methods to improve quality environmental learning. But the use of a wider range of teaching methods should be energised by the inclusion of the fabric of dimensions of education quality to improve teachers' and teacher educators' consciousness of how methods improve quality.

The model is based on the principle of the relationship between the phloem tissue and the companion cells in the process to transport food made in the plant to all parts of the plant. In the same way the translocation of knowledge which is two way between the teacher and the learner using new methods should be energised by the inclusion of the fabric of dimensions of education quality, which the teachers can reflect on to continuously improve their practice, and to become more conscious of quality enhancement. The EdQual vascular model is appropriate because the use of a wider range of teaching methods is likened to the phloem tissue as a means of knowledge transmission system. The fabric of dimensions of education quality is likened to the companion cells that energise the translocation process because the companion cells have a large number of mitochondria to power the movement of plant food to all plant parts such as stems, branches, fruits and roots. The model suggests that the way the phloem cells are interdependent on the companion cells in the translocation of plant food is the way the use of the wider range of teaching methods is interdependent to the inclusion of fabric of dimensions of education quality to improve the quality of education, and environmental learning, and by association the life of the learners and the community.

The study has also revealed that the analytical statements and recommendations of the study do not only apply to the improvement of environmental learning, but apply to all forms of teaching and learning at all levels of education.

Diagram of the vascular tissue analogy of the fabric of quality dimensions and the wider range teaching methods.

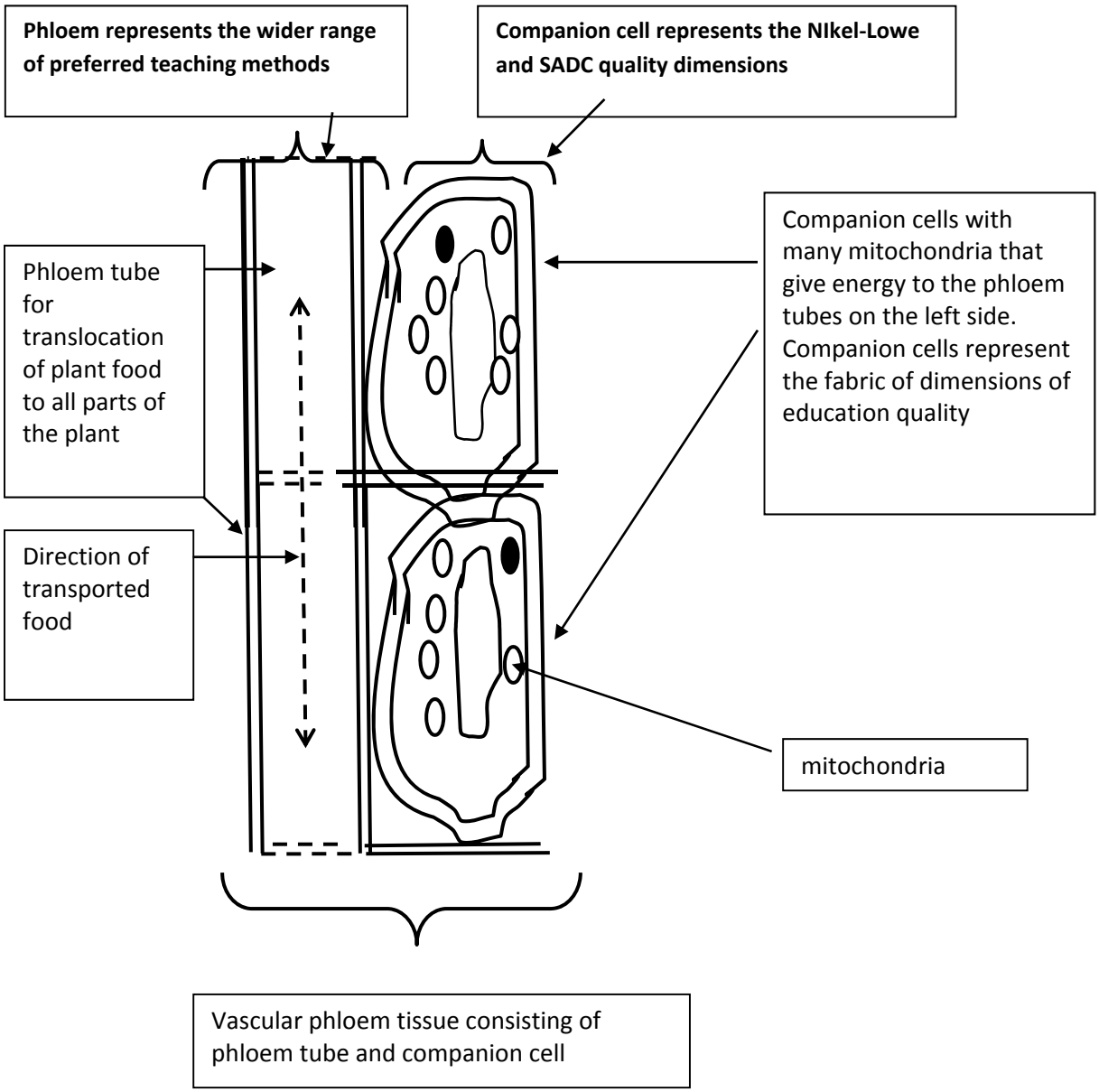


Figure 6.1: Analogy of the relationship between the use of a wider range of preferred teaching methods and the use of the fabric quality model for improvement of teaching and environmental learning.

5.4.9. Analytical Statement 9

The human rights and human capital traditional approaches to educational quality have effects on the teaching practice of teachers in Zambia, and this can be expanded by social justice approaches

As discussed in Chapter 2, the effect of the human capital and economic approach to educational quality has had a negative impact on the interpretation of the meaning of educational quality in Zambia (Carmody, 2004). This approach to quality of education has contributed to the emergence of teacher-centred teaching and environmental learning because its main objective was to produce learners who were to take jobs left behind by the colonial administrators. The dominance of teacher-centred teaching approaches was confirmed in the first workshop, as reported in Section 4.5. This approach to education quality did not accommodate effective pedagogy that was socially responsive and which included broader issues such as environmental issues.

As shown in the lessons, inclusion of broader socio-cultural and social justice concerns such as how education contributes to the life of the community, or how practices such as deforestation are exacerbating poverty and hunger, usher in a broader concern with social justice issues which are brought to the fore with quality dimensions such as sustainability, relevance, responsiveness and socio-cultural and structural dimensions. The study has shown that incorporating these concerns, can contribute to educational quality discussions that are wider than discussions about effectiveness, or equity only.

In the four lessons observed, the combination of these elements, particularly when all were achieved, allowed for successful performance by learners, integration of community and social ecological issues and democratic teaching and learning processes that were valued by teachers and learners. While more extensive research will need to be done to confirm this, it would seem that there is real practical potential to combine the human capital, human rights and social justice/capability approaches to educational quality, and that this may provide a more beneficial perspective approach to educational quality in environmental learning and education in general because it includes a broader view of educational quality, that also takes socio-cultural and structural dimensions more fully into account.

Recommendations: There is a need to research the practical aspects of combining these approaches to educational quality in more depth. This study has only been able to point towards some aspects of this, which could be further developed through broader processes and studies at district, provincial and national levels. This may help to improve the quality of education in general and that of environmental learning in primary schools in Zambia (MOE, 1997).

5.5. LIMITATIONS OF THE STUDY AND REFLECTIONS ON THE RESEARCH

The study showed that the use of a wider range of a new category of teaching methods improved the quality and relevance of environmental learning in all the schools that I worked with in the Mufulira district; reported in depth through the four lessons in Chapter 4, but not limited to these. However, as shown in this study, in-depth analysis of these lessons was limited to four lessons only, due mainly to the limited scope of this study. Further analysis of more such lessons would provide interesting additional data and insights into the research question, and could be an area for further research.

The study further indicated that teachers' use of teaching methods, and the planning and implementation of environmental learning processes were affected by the socio-cultural and structural dimensions of educational quality. The lifestyle, social problems, nutritional problems, language problems, and poverty-related issues are among the socio-cultural problems that hinder the learning process of learners (Dalli et al., 2011). Zambia's Ministry of Education, being located in a low income country, as reported by Tikly et al. (2007; 2009) has teachers who experience structural problems of over-enrolled classes, high teaching teaching-period loads, inadequate teaching materials and unsatisfactory conditions of service (Moose, 2009). As outlined above, the influence of these factors on educational quality brings an interesting regional perspective to educational quality research, which can be deepened and extended through further inquiry, particularly its relationship to teaching methods, as has been highlighted in this study, albeit in a limited manner. Research questions that would be interesting to probe in relation to this point may be "Are there teaching methods that are socio-culturally and structurally specific and responsive that can improve the quality and relevance of environmental learning?" and "Can contextual profiling of the socio-cultural and structural dimensions of education quality help to inform the use of specific teaching methods in ways that can enhance the quality of teaching and learning?"

As reported in Chapter 2, the study started by reviewing eleven education quality frameworks, but synthesised these within three dominant approaches which include the human rights approach, the human capital approach, and the social justice/capabilities approach, drawing on the SADC REEP research into educational quality and relevance in the context of environmental learning (Lotz-Sisitka, 2008; 2011) and other theorising on educational quality, particularly work emanating from the recent EdQual international

research programme (Barret et al., 2007; 2008; Tikly et al., 2009). While the study was able to provide some practical insights into these views on quality in the context of four lessons, much more research is needed to develop the use of the quality observation tool used in this study in relation to these theories or orientations to educational quality, as already mentioned above.

Additionally the implications of educational quality research (such as the research undertaken in this study) for teacher education curriculum development and practice requires further research. Only some small elements of this have been highlighted in this study, with regards to giving teachers time, space and support to reflect critically on, encounter, select, use and reflect on a wider range of teaching methods.

At a practical level, further limitations on the research were related to challenges of funding the research field work and time constraints; particularly because this research required intensive engagement within a process of development over a period of time.

5.6. CONCLUSION

As mentioned in Chapter 2 of this study, it is widely acknowledged that there is an education quality crisis in the majority of primary schools in Zambia. This study set out to understand this problem in more depth. It reviewed literature on educational quality issues and approaches, and focussed in on teaching methods, and how a wider range of teaching methods could potentially enhance educational quality, and the quality of environmental learning. Through workshops with teachers to reflect on existing methods, and to explore the potential of a wider range of new methods which teachers could select from and use, teachers agreed to try out a wider range of new methods. These lessons were observed, and were subjected to reflections using a quality analysis tool which was based on a 'fabric' model of educational quality produced by Nikel and Lowe (2010) and reviewed and extended with regional perspectives. Using this tool helped me to observe lessons, and to comment on aspects of quality in the context of the lessons. It also helped teachers to reflect on the quality of their lessons. The study showed that a variety of quality dimensions can be present in individual lessons, and that it is the balance or relationship between the quality dimensions that adds up to, or produces high quality teaching and learning.

It was also evident from the study that the use of a wider range of preferred teaching methods truly *can* contribute to the quality and relevance of environmental learning. The

study also revealed that while the use of a wider range of teaching methods improves quality and relevance of environmental learning the wider range of teaching methods should be accompanied with knowledge of the 'fabric' dimensions of educational quality, as this allowed for reflexivity and a means of 'telling' if the methods were contributing to educational quality or not.

The study also revealed that including Southern African regional dimensions of educational quality was very important so that educational processes and environmental learning in particular can be adequately contexualized, and so that learners can enhance meaning making. The study confirmed that teachers needed support to empower them with knowledge and skills to provide quality education, a point also made by Hart, Jickling and Kool (1999) and Ketlhoilwe (2008).

The study also shows that not all dimensions of quality need to be achieved in every lesson, but that inadequate achievement of one dimension can affect other dimensions of quality. It also showed that all dimensions of quality *can* be present in high quality lessons. While not explicit in the analysis of the four lessons (and this may require more in-depth research), it is possible to suggest that a wider range of teaching methods, that are more learner centred, and which address the quality dimensions outlined in this study, may better allow learners to develop new capabilities to choose the life they have reason to value, than the rather limited set of teaching methods used prior to the workshops held for this research.

And finally, I enjoyed working on this study. It has opened a door to understanding the historical context of educational quality discourses, and it has allowed me to explore the meaning of these in a teacher education context, as well as at the level of classroom practice. This was done through working with teachers to review, select, use and reflect on a wider range of teaching methods for environmental learning than those they had previously used. The use of these methods took place in the context of their subjects.

REFERENCES

Adelman, A. (1980). *How institutions of higher education function as business.* Publisher unknown.

Ankomah, Y.A., Koomson, J.A., Bosu, R.S., & Oduro, G.K.T., (2005). *A review of the concept of quality in education: Perspectives from Ghana.* EdQual Research Programme Consortium for Implementing Education Quality in the Low Income Countries. Ghana: University of Cape Coast.

Avalos, B. (2003). *Improving quality education: A challenging task*. Paper commissioned for the *EFA Global Monitoring Report 2005, The Quality Imperative*. Paris: UNESCO.

Ballantyne, R., Connell, S., & Fien, J. (2006). Students as catalysts of environmental change: A framework for researching intergenerational influence through environmental education*. Environmental Education Research*, *12* (3-4): 413 – 427

Barret, A.,Ali, S., Clegg, J., Hinostroza, E. J., & Lowe, J. (2008). *Initiatives to improve the quality of teaching and learning: A review of recent literature.* Background Paper for the Global Monitoring Report,EdQual Working Paper No. 11**.** University of Bristol, UK accessed on www.edqual.com December 2010.

Barret, A., Chawla-Duggan, R., Lowe, J., Nikel, J., & Ukpo, E. (2006). *Review of the international literature on the concept of education quality.* EdQual Project. University of Bath & University of Bristol.

Barret, A.M., Ali, S., Clegg, J., Hinostroza, E., Lowe, L., & Nikel, J. (2007*). Initiatives to improve the quality of teaching and learning: A review of recent literature 2008*. EdQual Research Programme on Implementing Education Quality in Low Income Countries. EdQual working paper no. 11. Accessed on www.edqual.com November 2010.

Barret, M.J. (2006). Education for the environment: Action competence, becoming, and story. *Environmental Education Research*. *13*(2), 209-223.

Bernstein, B. (1990). *The structuring of pedagogic discourse. Class, codes control.* London: Routledge.

Bernstein, B. (2000). *Pedagogy; symbolic control and identity. Theory, research, critique.* Littlefied: Rowman.

Blum, R.W. (2009). *Response to: Global Patterns of Mortality in Young People. Linked Commentary in Lancet.* 374:9693: 853-854.

Brodt, S. E., DeSanctis, G., and Emery, J. D. (2002). *Beyond Messages: The Effects of Informational and Relational Complexity on E-Communication Overload.* Paper presented at the Academy of Management Meeting, Denver.

Carmody, B. (2004). *The evolution of education in Zambia.* Lusaka. Bookworld Publishers.

Carr, W., & Kemmis S. (1986) *Becoming Critical: Education, knowledge and educational research*. London & Philladelphia: The Falmer Press.

Castle, E.B. (1956). *Principles of education for teachers in Africa*. Oxford: Oxford University Press.

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education*. London: Routledge.

Coombs. B. (1995). *Successful teaching. A practical handbook.* Ibadan: Heinemann.

Cornbleth. C. (1990). *Curriculum in context*. London: The Falmer Press.

Dadder, A., Baltodano, M., & Torries, D. (2003). *The critical pedagogy reader*. New York: Routledge Falmer.

Dalli, C (2011). *Quality early childhood education for under-two-year-olds; what should it look like? A literature review.* Accessed on www.edqual. November 2010.

Danermark, B., Ekström, M., Jakobssen, L., & Karlsson, J. (1997/2000). *Explaning society. Critical realism in the social sciences*. London: Routledge.

Daniel, H. (2008). *Vigotsky and research*. London:Routledge.

Datta, A. (1984). *Education and society. A sociology of African education*. London:MacMillan.

Dimmock, C (2000). *Designing the Learning-Centred School: A cross-cultural perspective*. London: Falmer.

Du Plooy, L. (1986). *Pedagogics for advanced students*. Pretoria: Haum.

Du Toit, D., &Squazzin. T. (2000). *The spiral model. Process based professional development model.* Pretoria: Learning for Sustainability Project.

Dummy, P. A., Dreyer, H., Steyn, P.D.G., Behr, A.L., & Vos, A.J. (1991). *Education for the student teacher* 2. Cape Town: Maskew Miller Longman.

Eaves, C. (2006). *Improving pedagocial approaches in environmental education that promotes action competence.* Wellington: Crown.

Elliot, J. (2007). *From 'human capital' theory to 'capability theory' as a driver of curriculum reform.* In Somekh, B., & Scwardt, T. *Knowledge production. Research work in interesting times.* (pp. 143 – 146). London: Routledge.

Ernst, J.A., & Monroe, M. (2006). *The effects of environment-based education on students' critical thinking skills and disposition toward critical thinking. Environmental Education Research,12* (3-4): 429-443.

Farrant J.S. (1964). *Principles and practice of education.* London: Longman.

Fien, J. (1993). *Education for the environment. Critical curriculum theorising and environmental education.* Deakin, Victoria: Deakin University Press.

Fraser, N., (2008).

Freire, P. 1970. *Pedagogy of the oppressed*. New York: Continuum

Giroux, H. (1983). *Theory and resistance in education*. South Hadley, Mass: Bergin and Garvey.

Giroux, H. (1989). *Schooling for democracy. Critical pedagogy for the modern age*. London: Routledge.

Greenwood*, D. J*. & Levin, M*.,* (1998) *Introduction to action research: social research for social change,* Thousand Oaks, Calif.: Sage Publications.

Hart, P., Jickling, & Kool. R. (1999). *Starting points: Questions of quality in Environmental Education.Canadian Journal of Environmental Education*, *4*, 104-106.

Hoabes, R. (2004). *Investigating strategies used by teachers to foster environmental learning in the Namibian life science curriculum.* Unpublished master's thesis, Rhodes University, Grahamstown

Hogan, A. R. (2007*).. Education in the wetlands and wetlands in education. A case study of contexualizing primary/basic education in Tanzania*. Master's Thesis, Rhodes University, Grahamstown.

Hogan, R. (2008). *Contextualization of formal education for improved relevance. A case of the Rufiji wetlands*. Tanzania. *Southern African Journal of Environmental Education*, *25,* 44-58.

Huckle, J. & Sterling, S. 1991. *Education for Sustainable Development.* London. Earthscan.

Jensen, B., & Schnack, K. (2006). *The action competence approach. Environmental Education Research,12* (3-4), 471-486

Jensen, B.B. (2004). *Environmental and health education. Views from an action oriented perspective. A case from Denmark. Journal of Curriculum Studies,36* (4), 405-425.

Johannessen, E.M. (2006). *Basic Education - also a question of quality*. Save the Children Norway s Research Fund. Educare

Kelly, M. J. (1999). *The Origins and development of education in Zambia.* Lusaka: Image Publishers Limited.

Ketlhoilwe, M.J. (2008). *Supporting environmental education and education for sustainable development in higher education institutions in Southern Africa.* SADC Regional Environmental Education Programme: Howick.

Kyburz-Graber (1999). *Environmental Education as Critical Education: how teachers and students handle the challenge*. *Cambridge Journal of Education*. ***29*** (3): 415-432

Lather, P. (1986). Research as praxis.*Havard Education Review,56* (3), 257-279.

Leach, L., & Moon, B. (2008) *The power of pedagogy*. London: Sage.

Liswaniso, P. (2009). *Quality education in Zambia on the horizon.* Lusaka. SACMEQ Policy Research No. 5: Zambia Paris:IIP.

Lotz-Sisitka H, (2004). *Positioning Southern African environmental education in a changing context.* Howick: SADC REEP.

Lotz-Sisitka, H**. (**2008) *Editorial: Environmental Education and Educational quality and Relevance. Opening the debate*. *Southern African Journal of Environmental Education*. *25*,1-13.

Lotz-Sisitka, H. (2009). *Epistemological access as an open question in education*. *Journal of Education, 46.*

Lotz-Sisitka, H. (2011*). Education for Sustainable Development and Educational Quality and Relevance.* Unpublished research programme report, Rhodes University, Grahamstown, South Africa.

Lotz-Sisitka, H., & Schudel, H. (2007). *Exploring the practical adequacy of the normative framework guiding South Africa's National Curriculum Statement. Environmental Education Research*, *13.*

Lotz-Sisitka, H., Olvitt, L., Gumede, M., & Pesanayi, T. (2006). *History and context of ESD in Southern Africa: Supporting participation in the UN decade of Education for Sustainable development.* Howick: SADC REEP.

Lotz-Sisitka, H., Olvitt, L., Gumede, M., & Pesanayi, T. (2006). *ESD Practice in Southern Africa: Supporting participation in the UN Decade of Education for Sustainable Development*. Howick: SADC REEP. Share-Net.

Maxwell, J. A. (1992). Understanding validity in qualitative research. *Harvard Educational Review, 62*(3), 279-300.

Moose, J. (2009). *Recontexualizing issues in the "NISTCOL" environmental education curriculum module for primary Diploma by Distance Learning in Zambia.* Unpublished M.Ed. Thesis, Rhodes University, Grahamstown, South Africa.

Namafe, C. (2008). *What selected schools of Western Province in Zambia are best at Environmental and Sustainability Education. Southern African Journal of Environmental Education*, *25*, 59-80

(NEEP-GET). National Environmental Education Programme 2005. Final synthesis monograph. Pretoria; NEEP-GET.

NEEP-GET project (2005*). The Learning for Sustainability Curriculum 2005 . Learning for sustainability: A monograph.* Johannesburg. Department of Education.

Nelson Mandela Foundation. (2005). *Emerging Voices: A report on education in South African Rural Communities*. Cape Town. HSRC Press.

Nikel, J. and Lowe, J., 2010. *Talking of fabric: A multi-dimensional model of quality in education.Compare: A Journal of Comparative and International Education*, 40 (5), pp. 589-605.

Nkamba, M., & Kanyika, J. (1998). *The quality of education. Some policy suggestions based on a survey of schools.* SACMEQ Policy Research No. 5. Zambia. Paris: HEP.

Nsubunga, Y. (2008). *A Bernsteinian analysis of the integration of resource management in the curriculum of a rural disadvantaged school. Southern African Journal of Environmental Education*, *25,* 98-112.

Obanya, P. (1980). *General methods of teaching.* London. MacMillan.

O' Leary, Z. (2004).*The essential guide to doing research*. London: Sage.

O'Donoghue, R. (1995). *Environments and methods.* Howick: Sharenet, SADC REEP.

O'Donoghue, R. (2001). *Environment and Active Learning in OBE. NEEP GET guidelines for facilitating and assessing active learning in OBE.* Howick: Sharenet.

O'Donoghue, R. (2005). *The environment, development and environmental education*. Howick: Sharenet, SADC REEP.

O'Donoghue, R.; Lotz-Sisitka, H.; Asafo-Adjei, R.; Kota, L. & Hanisi, N. 2007.*Exploring learning interactions arising in school-community contexts of socio-ecological risk.* In Wals, A. (Ed). *Social Learning towards a More Sustainable World.* Wageningen: Wageningen Academic Publishers. pp. 435-449

Orr, D.W. (2004). *Earth in mind: On education, environment, and the human prospect*. Washington, DC: Island Press.

Patton, M.Q. (1990). *Qualitative evaluation and research methods*. Newbury Park: Sage.

Perrot, E. (1982). *Effective teaching: A practical guide to improving your teaching.* London: Longman.

Popkewitz*, T.* (Ed.) (2000). *Educational knowledge: Changing relationships between the state, civil society, and the educational community*. Albany, N.Y.: State University Press.

Pretorius, J.W.M. (Ed) (1998). *Sociopedagogics: 2000*. Pretoria: J.L Van SchaiK Publishers.

Reason*, P. &*Bradbury*, H.,* (Ed.) (2001) *The SAGE Handbook of Action Research. Participative Inquiry and Practice. 1st Edition*. London: Sage.

Rickinson, M. (2006). *Researching and understanding environmental learning: Hopes for the next ten years. Environmental Education Research*, *12* (3-4), 445-457.

Robeyns, I. (2006), *The Capability Approach in Practice. Journal of Political Philosophy*, *14, 351–376.*

Robottom, I. (1993). *Policy, practice, professional development and participatory research. Supportring environmental initiatives in Australian schools (An Australian Report to The Environment and School Initiatives (ENSI) Project Organization For Economic Co-operation and Development.): Centre for Studies in Mathematics, Science and Environmental Education* Deakin University.

Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context.* New York: Oxford University Press.

Rogoff, B. (2003). First hand learning through intent participation.*Annual Review of Psychology,54,* 175-203.

Rosenberg, E. (2008). *Eco-Schools and quality of education in South Africa: Realising the potential. Southern African Journal of Environmental Education,25,* 25-43.

Rosenberg, E. (2009). *Teachers' workbook for environmental learning*. Rhodes University: CAPE Project.

Rosenberg, E., O'Donoghue, R., & Olvitt, L. (2007). *Educational methods and processes for responding to environmental and sustainability concerns.* Howick: Share-Net.

Rusbult, C. (2007). *Teaching methods*. Retrieved December 20, 2010, From http://www.asa3.org/ASA/education/tech/active.htm.

SAQMEC. (2000). SAQMEC Country Report for Zambia. Retrieved from http://www.sacmeq.org/reports.htm October 2010.

SAQMECII. (2006) SAQMEC II Report. Retrieved from http://www.sacmeq.org/reports.htm. October 2010.

Sen, A. (1999). *Development as freedom*. New York: Knopf.

Sen, A. (2009). *The idea of justice*. Cambridge, MA: The Belknap Press of Harvard University Press.

Shumba, O. (2008). Environmental sustainability and quality education: Perspectives from a community living in a context of poverty. *Southern African Journal of Environmental Education,25,* 81-97.

Simovska, V. (2007) *The changing meanings of participation in school-based health education and health promotion: the participants' voices. Health Education Research* 22(6):864-78

Sinyama, I. (2011). *Enabling social learning as a response to environmental issues through teaching of localised curriculum in Zambian schools*. Unpublished Master's thesis, Rhodes University, Grahamstown.

Somekh, B., & Lewin, C. (2005). *Research methods in the Social Sciences*. London: Sage.

Spoelder, M. W. (2009). *The conceptualization of quality education in Zambia.* Unpublished master's thesis, University of London. London.

Sriprakash, A (2008) *'Quality Education for All? Teachers and primary pedagogy in rural south Indian schools.'* British Association for International and Comparative Education, Annual Conference, 4 – 6 September 2008, University of Glasgow, UK.

Stige, B. (2002). *Culture-centered music therapy*. Gilsum, NH: Barcelona Publishers

Tanzania, MOE. (2001). *Environmental Education for Teacher Educators*. Dar-es-Salaam: E & D limited.

Tellis, W. (1997). *Application of a case study methodology. A qualitative report.* Retrieved on 28th October, 2005 from htpp://www.nova:edu/sss/Qr-3/tellis2.html

Tikly, L. (2010). *Towards a framework for understanding the quality of education*. EdQual Research Programme consortium on Implementing Educational quality in low income Countries, University of Bristol. Working paper no: 27. Accessed on www.edqual.org November 2010.

Tikly, L., & Barrett, A.M. (2009). *Social justice, capabilities and the quality of education in low income countries.* EdQual Research programme consortium on Implementing Education Quality in Low income Countries. EdQual Working Paper no. 18a. University of Bristol, UK. Accessed on www.edqual.com December November 2010.

Tikly, L., Barret, A.M., Nikel, J., & Lowe, J. (2010). *Understanding quality*. EdQual research programme Consortium on Implementing Education Quality in Low Income Countries. EdQual Working paper no. 18b. University of Bristol, U.K. and University of Bath. Accessed on www.edqual.com. October 2010.

Tilbury, D. (2011). *Education for Sustainable Development. An expert review of processes and Learning*. Geneva. UNESCO.

UNESCO, (1993*). EFA Global Monitoring Report 2 0 0 5. Understanding education quality.* Paris. UNESCO.

UNESCO (2005). *Education for All (EFA), Global Monitoring Report.* Paris: UNESCO.

UNESCO (2005*). United Nations Decade for Education for Sustainable Development: framework for a draft international implementation scheme.* Draft document. October, 2004 (see also www.unesco.org/desd).

Unterhalter, E. (2007) *Gender, schooling and global social justice.* London: Taylor Francis Routledge.

Vygotsky, L.S. (1978). *Mind in society.* Cambridge, MA: Harvard University Press

Vygotsky, L.S. (1987). *Thinking and speech. In R.W. Rieber and Carton (Eds), The collected works of Vygotsky.* New York: L.S.

Walker, M. (2005). *Amartya Sen's capability approach and education. Educational Action Research, 13* (1), 103-110.

Wals, A.E.J. (2007). *Social learning towards a sustainable world.* The Netherlands: Wageningen Academic publisher.

Wals, A.J. (1990). *Education in action: a community problem-solving program for schools. .Journal of Environmental Education*, *21(4), 13–19.*

Wedgewood, R. 2005. *Education and Poverty Reduction in Tanzania*. Paper presented at 8th UKFIET International Conference on Education and Development, September 13th-15th 2005, Oxford HakiElimu

Wigley, J. (2003) *Environmental Education Methods*. Howick: Share-Net.

Wood, D. (1998). *How children think and learn (2nd Ed).* Oxford: Blackwell Publishing.

www.wisegeek.com, (2009). *Teaching Method.* Retrieved December 20, 2010. From http://www.wisegeek.com

Yin, R.K. (2009).*Case study research: Design and research* (4th ed.). London: Sage.

Zambia. IOD. (2008).*Impact evaluation: Policy and operation evaluation department. 312, April 2008.* Lusaka: Government of Zambia.

Zambia. MOE. (2000). *Zambia Primary School Syllabus.* Lusaka. Curriculum Development Centre.

Zambia. MOE. (1997). *Zambia Education Reforms.* Lusaka.

APPENDICES

APPENDIX A: PRE-WORKSHOP QUESTIONNAIRE

Questionnaire on use of existing methods

1. Which methods acquired from teacher training college are you currently using to teach environmental education at your school?
2. How have those methods acquired from teacher training college improved life of the children in your school and in the community?
3. Have those methods engaged school children in correcting any environmental problem(s) at your school and community?
4. Which of the methods acquired from teacher training do you not usually use? Why do you not usually use them?
5. Besides those methods acquired from college, are there any new teaching methods you have acquired and use to teach environmental education?
6. How often do you refer to community issues in your planning of which methods you use in your teaching?
7. Are there any community problems/issues that have made the use of teaching methods difficulty in your school?
8. How has the Parents Teachers Association (PTA) contributed to the efficient use of teaching methods?
9. How has the geographical location of your school effectively and efficiently contributed to the use of teaching methods in your school?
10. How has the use of local and official language influenced the use of teaching methods at your school?

APPENDIX B: FOCUS GROUP QUESTIONNAIRE

Focus group Trial Questions

1. Make a list of teaching methods that you usually use in your day to day teaching?
2. What are the reasons for using such teaching methods?
3. What factors do you consider when choosing a teaching method that you want to use in your teaching?
4. Are there any methods that you sometimes wish to use in your teaching but for some reason(s) you are unable to use? What reasons makes you not to use such methods?
5. What in your view are characteristics of
   (i) An effective teaching method?
   (ii) A teaching method that makes learning relevant to the learner?
6. Which teaching methods do you find easy to use? Why are these methods easy to use?
7. Which teaching methods do you find difficulty to use? Why are these methods difficulty to use?

APPENDIX C: COMPARISON BETWEEN THE EXISTING METHODS AND THE NEW CATEGORY OF TEACHING METHODS

EXAMPLE OF THE TEACHERS' COMMENTS DURING THE SECOND REFLECTION WORKSHOP ON THE USE OF EXISTING AND THE NEW CATEGORY OF TEACHING METHODS,

Q1. What are your observations on the use of existing methods and new category of new teaching methods before the workshops and after the workshops?

(i) Comments on the existing methods

……

……

……

……

……

……

……

……

(ii) Comments on the use of the new category of teaching methods

……

……

……

……

……

……

……

……

……

APPENDIX D: FOCUS GROUP RESPONSES BY TEACHERS

1. Make a list of teaching methods that you usually use in your day to day teaching?

" I use Question and answer; demonstration; groupwork; and lecture method" (T1-9; FN, 29/03/10)

2. What are the reasons for using such teaching methods?

"such methods are easy to work with'; they do not require time to prepare"; they do not involve much preparation of teaching and learning aids" (T1-6; FN, 29/03/10)

3. What factors do you consider when choosing a teaching method that you want to use in your teaching?

"age of the learner'; ability of learner"; "time for the lesson"; (T3-7; FN, 29/03/10)

4. Are there any methods that you sometimes wish to use in your teaching but for some reason(s) you are unable to use? What reasons makes you not to use such methods?

"Fieldwork"; "Guest speaker"; (T1-9; FN, 29/03/10)

5. What in your view are characteristics of

(i) An effective teaching method?

"a lesson where all the lesson specific objectives are achieved"; a lesson with learners doing practical work; (T3-8; FN, 29/03/10)

(ii) A teaching method that makes learning relevant to the learner?

"a teaching method which makes learners understand the concepts clearly" (T6-9; FN, 29/03/10)

6. Which teaching methods do you find easy to use? Why are these methods easy to use?

"Lecture method; group work; question and answer and discussion method" (T1-9; FN, 29/03/10)

7. Which teaching methods do you find difficulty to use? Why are these methods difficulty to use?

"Those that require more time to prepare because I do not have much time because I teach double session; those that require practical work because the classes I teach are with more than 40 learners in one class" (T1-7; FN, 29/03/10)

APPENDIX E: REFLECTIVE SEMI-STRUCTURED QUESTIONS BEFORE AND AFTER LESSONS

(i) Before and after the lessons were taught and after lesson was taught.

Q1. What teaching methods did you use in the lesson?

Q2. Do you think that you could have used the same teaching method if you did not participate in the workshops?

Q3. Did you notice any differences in the way your pupils acted during the lesson as a result of using the new category of teaching methods?

(ii) Before and after the workshops

Q1. Which workshop activity/activities of the workshop was/were most helpful to your teaching?

Q2. Mention one or two things you learnt from the workshop which you will become as good classroom practice in future?

APPENDIX F: TRANSCRIBED INTERVIEW WITH A TEACHER (transcribed from video tapes)

DATE: …06/04/2010 VENUE:…TEACHER'S. PREPARATION ROOM

NAME TEACHER:MRS REGINA MWANSA SCHOOL:MUTUNDU BASIC SCHOOL.

<u>TEACHER'S COMMENTS AFTER THE LESSON:</u>

1. ON THE NEW TEACHING METHOD:

(i)……

(ii)……

2. THE BENEFITS OF THE NEW METHODS TO THE LEARNERS

(i)……

…….

(ii)……..

……..

3. WHAT THE LEARNERS DID DURING THE LESSON

(i)……..

.

(ii)……

(iii)……

4. WHAT THE LEARNERS LEARNT DURING THE LESSON AS ARESULT OF THE NEW

TEACHING METHOD

(i)……..

(ii)……

5. ISSUES OF NIKEL AND LOWE QUALITY DIMENSIONS IN THE LESSON

(i)……

(ii)……

6. ISSUES OF THE SOUTHERN AFRICAN SOCIO-CULTURAL AND STRUCTURAL DIMENSIONS OF EDUCATION QUALITY IN THE LESSON

(i)……

(ii)……

APPENDIX G: SELF COMPLETION QUESTIONNAIRE ABOUT THE TEACHERS' CLASSROOM PRACTICE WITH EXISTING AND WIDE RANGE OF NEW CATEGORY OF TEACHING METHODS

1. **Mention any three teaching methods that you are using in you teaching at the moment?**

(i)……..

(ii)……

(iii)……

2. **Why do you like using the methods in Q1 above?**

(i)……..

(ii)……..

3. **How do your learners benefit from the teaching methods in Q1 above?**

(i)……

(ii)……

4. **Mention three new teaching methods?**

(i)……

(ii)……..

(iii)……..

5. **How did the learners benefit from the new teaching methods?**

(i)……

(ii)……

(iii)……

6. **What are some of the differences between the existing teaching methods and the new categories of teaching methods?**

(i)……

(ii)……

(iii)……

APPENDIX H: LESSON OBSERVATION INSTRUMENT WITH OBSERVATION NOTES

6/4/10 Mutwiche Basic School

OBSERVATION INSTRUMENT

S/N	QUALITY DIMENSION	COMMENTS BY LESSON MONITOR
	PART 1. NIKEL & LOWE DIMENSIONS	
1	**EFFECTIVENESS** • Did teaching method/methods help achievement lesson objectives? • Were targets made in the lesson?	it was not clear if the methods used helped to achieve lesson expected outcomes because the expected outcomes were not specific and the methods were not specifically or clearly written in lesson plan - Tos.
2	**SUSTAINABILITY** • Has the method addressed well being & concerns of individuals, communities, & national responsibility for any changes for now and future generations? — NO • Has the method referred to the people – environment – relationships? → NO • Has the method developed any knowledge, skills, values to promote Sustainability practices? • Has the method recognized any limitation of natural resource base?	The method was written in form of Ts & Learner activity. → yes, but the knowledge and skills acquired did not promote sustainability practices. → NO, why lesson did not refer to any limitations.
3	**REFLEXIVITY** • Has the method referred to any educational responses towards social rapid changes in the environment? • Has the method referred to any awareness to existence of feedback loop in human actions?	— NO, why? — No, why?
4	**RELEVANCE** • Has the method addressed learners' needs? • Has method identified any issues in the community? • Has method matched age of learner with issues identified in community? • Has the method emphasized the engagement of learner with any of the identified levels in community?	— NO — NO — NO — NO
5	**RESPONSIVENESS** • Has method responded to any environmental changes? • Has method responded to environmental changes affecting individual learning ability? • Has the method considered responsiveness to context?	— NO — NO — NO

2

6	**EQUITY** • Did the teaching method provide learners equal chances to lesson knowledge and concepts? • Did the method possess the potential to redress any social injustices? • Did method address economic, political, social inequalities?	
7	**EFFICIENCY** • Did the teaching method possess ratios of inputs and outputs (i.e. did the teaching methods have properties that enabled the learners to assimilate the concepts?) • Did the input factor bring about maximization of outputs/ or maximization of grasping concepts?	
	PART 2. SOUTHERN AFRICAN CONTEXTUAL DIMENSIONS	
8	**SOCIO-CULTURAL** • Has the method considered any social issues affecting the teaching and learning process? • Has the method considered any cultural issues affecting acquisition of knowledge by the learner? • Has method considered learners' prior knowledge? • What type of language was used in the method? • Has the method considered any socio-cultural advantages of the learner? • Has the method considered any socio-cultural disadvantages of the learner? • Has the method considered any moral, religious aspects of the learner?	
9	**STRUCTURAL** • Has the method considered the effect of built environment in the school and classroom? • Has the method been affected by the school curriculum organization • Has the method been affected by the community organizational structure? • Has the method been affected by the teacher's levels of motivation? • Has the method been affected by teachers' knowledge? • Has method been affected by availability and usage of learning support matrials?	

APPENDIX I: TRIANGULATED FIELD NOTES

SCHHOL: MUTUNDU BASIC **DATE:06/04/2010**

TEACHER: MWANSA REGINA **SUBJECT: SOCIAL STUDIES**

TOPIC: ENVIRONMENT **SUB-TOPIC: FORESTS**

TEACHER'S POST LESSON COMMENTS:

"I have enjoyed teaching the topic on environment and forests and their importance by using the new category of teaching methods of Learning by doing and Practical Action taking. By using the new method the learners were able to do the following:

(i) Become aware of the uses of forests

(ii) Disadvantages of cutting down all trees

(iii) Actions to take to restore the forests such as planting trees

(iv) Participation by learners in planting the tree during the lesson on 06/04/2010 (FN, 06/04/10)

SECOND VISIT TO THE SCHOOL ON 30/07/2010 TO OBSERVE THE SECOND LESSON FINDINGS AND TRIANGULATION OF THE FIRST LESSON ACTIVITIES

DATE: 30/07/2010

(i) The tree that was planted on 06/04/2010 was "dead" because the plant that was planted was not at the spot where it was planted. The spot where the plant was planted was dry. It was confirmed that the teacher and the learners did not care fo the plant. The teacher who taught the lesson on 06/04/2010 was not in the school.
(FN, 30/07/10)

(ii) When later talked to the teacher who taught the lesson on learning by doing and practical action taking confirmed that the tree was destroyed by other learners from other classes. She said there was no security in the school grounds. She said the learners should be taught more on how to care for the environment within the school and at their homes.

(iii) What happened at Mutundu basic school was a problem of both the socio-cultural and structural issue of the Southern African dimension of education quality because it has to do with the lifestyles and behavior of the learners and their attitude toward the environment (FN, 30/07/10)

APPENDIX J: LEARNERS' WORK USED TO ANALYSE LESSON

Learners Worksheet 29/7/10

A visit to a local human settlement

Name of the local human settlement
Kantanshi township

What type of pollution: Land pollution.

What people do: They throw rubbish anyhow and when they sweep they do not get the dirty that they swept to throw in the bin.

What people should not do: They should not throw rubbish anyhow. and they should throw the dirty that they swept in the bin.

APPENDIX K: LETTER OF AUTHORIZATION FOR PARTICIPATION OF TEACHERS IN THE RESEARCH

APPENDIX K: LETTER OF AUTHORITY TO WORK WITH THE TEACHERS

All correspondence should be addressed to the Principal

Telephone: 412340, 412157

In reply please quote

No.....

REPUBLIC OF ZAMBIA

MINISTRY OF EDUCATION

MUFULIRA TEACHER TRAINING **COLLEGE**
P.O.Box 40400
MUFULIRA - ZAMBIA

12TH February 2010

THE DISTRICT EDUCATION BOARD SECRETARY (DEBS)

MUFULIRA DISTRICT.

RE: INTRODUCTION: MR. EVARISTO KALUMBA M.ED. ENVIRONMENTAL EDUCATION STUDENT.

I write to introduce Mr. Evaristo Kalumba as member of staff at Mufulira College of Education and currently on Field research as a Master of Education, Environmental Education student at Rhodes University in South Africa. His interest is to conduct a research with nine teachers in selected three schools in Mufulira.

His research topic and question are listed below:
Research Topic: Improving quality and relevance of education through use of a wider range of teaching methods in primary schools in Zambia.
Research Question: How can the use of a wider range of teaching methods improve the quality and relevance of environmental learning in primary schools in Zambia?
Your cooperation in his research will be appreciated.

S. MULENDEMA
A/VICE PRINCIPAL