REORIENTATION OF THE TEACHER EDUCATION CURRICULUM FOR SUSTAINABILITY AT DAVID LIVINGSTONE COLLEGE OF EDUCATION IN LIVINGSTONE, ZAMBIA

By

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A dissertation submitted to the University of Zambia, School of Education in partial fulfillment of the requirements for the award of the degree of Master of Education in Environmental Education

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DECLARATION

I, **Juliet Muzyamba Sichaaza**, do here declare that this dissertation is my own work and that it has never been previously submitted for a degree at the University of Zambia or any other University.

Author's Signature…….. Date……

APPROVAL

This dissertation of **Juliet Muzyamba Sichaaza** is hereby approved as a partial fulfillment of the requirements for the award of the degree of Master of Education in Environmental Education of the University of Zambia.

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ABSTRACT

The purpose of this study was to investigate the quality of the reorientation of the teacher education curriculum for sustainability at David Livingstone College of Education (DALICE) in Livingstone-Zambia. It was located in the Third Action Area of the Global Action Programme on Education on Sustainable Development, a follow-up to the United Nations Decade of Education for Sustainable (2005-2014). Its specific objectives were to: examine the quality of curriculum content; assess the quality of the teaching approaches; establishing existing potential opportunities and development of a model for quality reorientation of teacher education curriculum towards sustainability at DALICE. Literature on the quality of the reorientation of teacher education for sustainability emphasized the importance of developing holistic curriculum content, use of theory, practice and field based teaching approaches, creation of spaces of learning. However, there was little information on the quality of the reorientation of teacher education for sustainability at DALICE.

A phenomenological research design with qualitative approaches was employed and participants who were purposively selected comprised: 3 officials from Teacher Education and Specialised Services (TESS) and 2 from Zambian National Commission for UNESCO. Other participants were; 4 Heads of Departments, 8 Lecturers and 20 Students from DALICE. The data was generated through semi-structured interviews, observation checklist and document review. Thematic and content techniques were used to analyze data. The results showed that efforts were made in the 2013 Zambian teacher education reform to reorient the teacher education curriculum for sustainability and keep-up with sustainability educational needs of the pre-service student teachers. However, the desired teaching professional competencies in ESD were not clearly defined in a functional way and ESD was presented in a globalized manner. It was also noted that, a holistic approach to the development of the teacher education curriculum reoriented for sustainability at all the stages was not adopted, as there was no evidence of interdisciplinary view where the social, ecological and economic dimensions of sustainability are well balanced in all the study areas and forms of the teacher education curriculum. The overall conclusion was that, the quality of the reorientation of teacher education curriculum for sustainability at DALICE was partial, as it lacked relevant knowledge and competences to adequately prepare students for sustainability teaching. To maximize the benefits of preparing the students for sustainability teaching, this study recommended the use of a holistic approach, a philosophy of ESD to the development of the teacher education curriculum with the aim, goal and vision of the college, nation and ESD in mind. A shift from disciplinary to interdisciplinary view of the teacher education curriculum where the social, ecological and economic aspects of sustainability are well balanced and clarified to the target audience in the cultural contexts was also recommended. Furthermore, a model which illustrates how the whole-institutional approach could greatly contribute to the improvement of quality agendas in the reorientation of the teacher education curriculum for sustainability was suggested in this study.

Key words: *Reorientation, Education for Sustainable Development and Teacher Education*

DEDICATION

I dedicate this dissertation to my father, late Nathan Muzyamba Sichaaza, and my mother, Diana Moono, for their wisdom and encouragement in my career life.

ACKNOWLEDGEMENTS

The almighty God deserves my thanks for His everlasting love, protection, kindness which made this study possible.

My supervisor, Dr Innocent Mutale Mulenga, is thanked for the guidance and support, without which, this work could not have been completed successfully. He continued encouraging me to read more and focus on my topic 'Reorientation of the teacher education curriculum for sustainability at David Livingstone College of Education'.

I also wish to express my gratitude to participants from the Zambian National Commission for UNESCO, Directorate of Teacher Education and Specialized Services, David Livingstone College of Education Administrators, Heads of Department, Lecturers and Students for their cooperation and support during data collection.

My gratitude is also extended to the following Lecturers of Environmental Education for all the support they gave me throughout this study: Prof Charles Namafe, Dr Liberty Mweemba, Mr Manoah Muchanga, Dr Lillian Chipatu and Mr Phiri.

My most sincere gratitude also goes to my parents Nathan and Diana, sisters, brothers and my course mates, Everisto, Brian, Micheal Ndila, Matongo Ngoma, Simpilo, Loveness and Gwenie for their endless motivation.

Finally, I am very grateful to my friends Catherine, Belinda, Sylvia, Shirley, Maliwa, Mwaka, Lungowe and Inonge for their prayers and support in diverse ways.

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ACRONYMS

AISHE	Auditing Instrument for Sustainability in High Education Geographical
DALICE	David Livingstone College of Education
EFS	Education for Sustainability
ESD	Education for Sustainable Development
GAP	Global Action Programme
GAP-ESD	Global Action Program on Education for Sustainable Development
GASU	Assessment of Sustainability in Universities
MoE	Ministry of Education
SAQ	Sustainability Assessment Questionnaire
SD	Sustainable Development
ULSF	University Leaders in Sustainability Forum
UNDESD	United Nations Decade of Education for Sustainability
UNEP	United Nations Environmental Education Programme
UNESCO	United Nations Educational Scientific and Cultural Organisation
WCED	World Conference on Environment and Development

OPERATIONAL DEFINITIONS OF TERMS

Reorientation Refers to the integration, mainstreaming or incorporation of Education for sustainability philosophy, content and activities within the teacher education system to such an extent that education for sustainability is embedded within all policies and practices.

Sustainability Is understood as the goal or end product of sustainable development. It can also be said to be a paradigm of thinking about a future in which environmental, social and economic considerations are balanced in the pursuit of development and an improved quality of life.

Sustainable Development: Is the process of meeting the needs of the present generation without compromising the ability of future generations to meet their own needs. It is also understood as development that improves the quality of life while living within the carrying capacity of life-supporting ecosystems.

Teacher education: Refers to the policies and procedures designed to equip pre-service Junior Secondary Student Teachers in Colleges of Education with the knowledge, attitudes, skills and values they required to perform their tasks effectively in the classroom, schools and wider community.

Quality refers to the extent to which an education project or programme produces the desired results in ESD

CHAPTER ONE: INTRODUCTION

1.1 Overview

In this chapter, an overview of this study will be given by providing a contextual background to the setting of the study and tracing the historical emergence of reorientation of teacher education curriculum towards sustainability. Sustainability initiatives in some of the world regions and in Zambia in particular have been highlighted. Other subsections of this chapter include: brief description of the statement of the problem, purpose of the study, specific objectives, research questions, theoretical framework, and conceptual framework. The significance of the study, delimitations, limitations and operational definitions are also described. Then, a summary of the chapter will be given.

1.2 The Background

Education for Sustainable Development (ESD) emerged from the first United Nations Earth Summit in Rio de Jenairo-Brazil in 1992, as one of the strategies for tackling the global environmental, social and economic issues that threatened the well-being of people and natural environment around them. The United Nations (UN) member states, including Zambia at that Earth Summit committed themselves through Agenda 21 to promoting environmental sustainability through education in various ways, which included the reorientation of teacher education towards sustainability (United Nation, 1992). This was vital as the mounting concern for global sustainability challenges in the 21st century required teachers and educators with critical skills, values; personal characteristics and specialized based knowledge to turn the idea which seemed abstract into reality for all the people of the world (Palmer, 1998). However, it should be acknowledged that the idea of ESD in the teacher education curriculum, as it was in any other professional education curriculum, was not only about empowering pre-service students with the right teaching professional knowledge and skills, but also to transform the target audience into valuable members of any given society where they were required to contribute positively to the creation of sustainable societies.

According to Mckeown *et.al.,* (2002), ESD, which in this study is also referred to as Education for Sustainability (EFS), is described as a new transformative learning process that equips learners, teachers and school systems with the new knowledge and ways of thinking needed to achieve economic prosperity and production of responsible citizenship, while

restoring the health of the living systems upon which lives depend. Recognizing the importance of the transformative function of education at all levels, the UN declared the period between 2005 and 2014 as the UN Decade of Education for Sustainable Development (UNDESD) at the Post Rio +10 UN Earth Summit in Johannesburg South Africa in 2002. The vision of this decade was a world where everyone has an opportunity to benefit from education and learn behavior, values and lifestyles required for sustainable living and positive societal transformation (UNESCO, 2006).

Huge efforts were made during that decade by United Nations Educational Scientific and Cultural Organization (UNESCO) which was the lead agency and other international education organizations to design guidelines for the implementation of the UNDESD. In most of the UN regions, countries also made commitments which centered on sharpening of ESD agendas, clarity on the scale and drivers of change required in the direction towards sustainability (UNESCO, 2006 & 2016). Despite such huge and promising efforts that were made to popularize ESD globally during that decade, Zambia and some of the UN member states delayed reorienting their teacher education curricular for sustainability. As revealed in the UNESCO's Global Education Monitoring Report (2016), out of 66 countries surveyed in 2013, only 8% of these countries reoriented their teacher education curricular for sustainability up from 2% in 2005.

Quality in the reorientation of the teacher education curriculum reoriented for sustainability is learner-centered and it is more than academic performance and does not require global or national pronouncements. The whole process of formulating the target teaching professional competencies involves value judgments, and if ESD emerged as an educational response to sustainability, it invokes the ideas of conversation, debate, reflection and emotional reactions during curriculum development as observed by (Summers *et. al.* 2005 & Eblaz, 1993). Teaching in the 21st century was not anymore viewed as a mere transmission of theories or facts to learners, but as a multi-faceted phenomenon (Khan, 2012). It is a learnt and learning profession, the notion which sets teaching profession within a life-long learning which has to do with formal, informal and non-formal education processes (Mulenga, 2015). Therefore, the survival of ESD in the teacher education curriculum heavily depends on the understanding of what sustainability means to the teaching profession and key stakeholders who offer support in the preparation of teachers for sustainability teaching.

Unfortunately, for many decades in most Southern African countries such as South Africa, the colonial legacies in higher education institutions had alienated learners in higher education institutions from responding to immediate social, ecological and economic problems and such unsustainability practices in education systems, persisted even in the post-colonial eras in the whole region (Togo, 2009). In Zambia, as it was in other countries in Southern African Region, there was some urgency to the inclusion of ESD in the teacher education curriculum because this Region was identified as being highly vulnerable to the adverse effects of climate change by the Intergovernmental Panel on Climate Change (IPCC) as reflected in its Fifth Assessment Report (Nhamo & Shava, 2015). With its transformative goal, ESD has interesting features that justify its inclusion in the teacher education as it seeks to improve the quality of education and training, increase the learning content, give more meaning to the curriculum, contribute to innovative teaching approaches and increase a variety of assessment tasks (Laurie *et.al.,* 2016).

Reorientation of any professional education for sustainability is not the education business as usual where pre-service teachers are socialized into unsustainable aspirations which instead of liberating them from the real social, ecological and economic issues presented to them by society, blind them. It goes beyond the usual narrow way of developing any professional education curriculum, as it focuses on the transformative, liberalization, vocational and socialization functions of education, of all which are all considered as important in the preparation of learners in higher education institutions for social responsibilities in their societies (Sterling, 2011). Having recognized the importance of ESD in bringing about the desired sustainable life-styles through education and being one of the UN member states, Zambia at the Post Rio + 20 in 2012, in Rio de Jenneiro in Brazil, agreed to continue promoting ESD more actively beyond the UN decade of ESD (2005-2014) in all areas and forms of education (UNESCO, 2016).

As reflected in the 'The Future We Want', the outcome document of the Post Rio + 20, the Global Action Programme on ESD (GAP-ESD) which responds to that agreement was also developed at the same summit. Through its two objectives, the GAP-ESD contributed to the 2030 Agenda for Sustainable Development and general movement towards the achievement of the Sustainable Development Goals (SDGs) (Post Millennium Goals). The UN member states, and Zambia inclusive, also recognized the need to support higher education institutions including colleges of education to secure research, innovation and skills that governments needed to advance national sustainable development objectives (UNESCO, 2016 & 2014).

Although such efforts for the first time in Zambia were reflected in the 2013 Revised National Education Curriculum Framework which highly recognized ESD as one of the major issues of national concern (Ministry of General Education, 2013), for ESD innovations become real, the institutions involved must go through the 'necessary process' and 'practice' what they 'teach' (Mckeown *et.al.,* 2002).

It was from this background that this study aligned itself with a holistic approach to the investigation of the quality of the reorientation of the teacher education curriculum for sustainability at David Livingstone College of Education in Livingstone of Zambia. This study was influenced by the objectives of the GAP-ESD and specifically located in the Third Priority Action of the GAP-ESD which emphasized the need to empower pre-service and in-service teachers with the necessary knowledge, skills, values, motivation and commitment to introduce ESD in learning institutions and society as a whole (UNESCO, 2016). David Livingstone College of Education was suitable for this study because it was one of the colleges of education where efforts to reorient the teacher education curriculum for sustainability were made in 2014, but since then, the quality of such initiatives had not been investigated. Other colleges of education in Zambia where efforts to reorient teacher education curriculum for sustainability were made included: Kitwe, Chipata, Charles Lwanga, Mufurila, Sowlezi, Mansa and Kasama Colleges of Education (Ministry of General Education 2013).

1.3 Statement of the Problem

The overall problem that this study sought to address was that, the picture of the quality of the reorientation of the teacher education curriculum for sustainability in colleges of education was still patchy in the related literature, because it had not been investigated. As a new study area in the Zambian national teacher education curriculum framework and being tied closely to the UN GAP-ESD, a global call to promote ESD more actively in all areas of education at the Post Rio + 20 Earth Summit, ESD had attracted the attention of many policy-makers, educationist and researchers globally and in Zambia in particular (Ministry of General Education, 2013 & UNESCO, 2012). However, as evident in the background, many countries were still grappling, but little attention was given to the investigation of the quality of the reorientation of the teacher education curriculum for sustainability in colleges of education (UNESCO's Global Education Monitoring Report, 2016).

Quality in ESD implied providing pre-service teachers with necessary knowledge, skills, values, motivation and commitment for assuming responsibilities for sustainability. It was all about the education that addressed the present and future needs of the learners in question (Laurie *et. al.,* 2016, UNESCO, 2012 & The European Trade Union Committee for Education, 2002). Given the background, sustainability challenges were on the increase and innovations that had been undertaken in Zambian teacher education systems as responses to critical sustainability issues seemed to be closely tied to global agendas such as the GAP-ESD without sufficient local participation. If there was scarcity of literature on the quality of reorientation of the teacher education curriculum for sustainability in Zambian colleges of education, then one wonders how this process could be improved in ways that could help to produce teachers of high quality in ESD. It was this knowledge gap that prompted the researcher to investigate the quality of the reorientation of the teacher education curriculum for sustainability at David Livingstone College of Education.

1.4 Purpose

The purpose was, therefore, to assess the quality of the reorientation of the teacher education curriculum for social, ecological and economic sustainability at Zambia's David Livingstone College of Education.

1.5 Objectives

The specific objectives of this study were to:

i) examine the quality of curriculum content in reorienting teacher education curriculum to address sustainability at David Livingstone College of Education.

ii) assess effectiveness of teaching approaches which were being used by lecturers in reorienting teacher education curriculum towards sustainability at David Livingstone College of Education.

iii) establish opportunities for scaling-up the reorientation of teacher education curriculum to address sustainability at David Livingstone College of Education.

iv) develop a model for quality reorientation of Teacher Education to address sustainability at David Livingstone College of Education.

1.6 Research Questions

The specific research questions were:

i. How was the quality of curriculum content in reorienting the teacher education curriculum for sustainability at David Livingstone College of Education?
ii. How effective were the teaching approaches which were being used by lecturers in reorienting the teacher education Curriculum for sustainability at David Livingstone?
iii. What potential opportunities existed to scale-up the reorientation of teacher education curriculum for sustainability at David Livingstone College of Education?
iv. How could a model for quality reorientation of the teacher education curriculum for sustainability at David Livingstone College of Education be developed?

1.7 Theoretical Framework

This study was grounded in the wider paradigm of transformative theory of learning (Mezirow, 1997). This theory entails three significant dimensions and these are: Psychological (changing in understanding of self); convictional (the revision of belief systems) and behavioral (change in life-styles) (Clark, 1993 & Mezirow, 1997). The major strength of the transformative theory of learning is that, it identifies contextual realities of learning experiences as key in the transformation process. Within the institution, major changes during the reorientation of any education curriculum for sustainability occur to reinforce and support curricular changes and its purpose is achieved when the target learners learn how to transform themselves and society they live in towards sustainability (UNESCO, 2012 & Mckeown, *et.al*., 2002). It was on this basis that the transformative theory of learning framed this study, in which the quality of the reorientation of the teacher education curriculum for sustainability at David Livingstone College was investigated.

1.8 Conceptual Framework

The quality of the reorientation of teacher education curriculum for sustainability was the main focus of this study. It was defined as the incorporation of ESD philosophy, content and activities within the teacher education system to an extent that ESD is embedded within all policies and practices. ESD uses a holistic approach as its philosophy to the development of any education curriculum reoriented for sustainability because of the following: its focus was on the development of the *whole person*; its considered *all areas of experience* (the three forms of education); It required an interdisciplinary view where the social, ecological and

economic domains of sustainability were balanced and it focused on the *whole picture* surrounding sustainability issues (like, the history, values, perceptions, emotions, techniques, and traditional processes that cause the problem and actions for sustainability) (Ferreira *et.al*, 2006).

As illustrated in the conceptual framework of this study (figure 1), transformation of pre-service student teachers into professionals with responsibilities across the dimensions of the sustainability is the primary goal of ESD. Teacher education in this study was not only viewed as a goal or an end product of sustainability, but also as one of the several inputs in the achievement of Zambian national sustainable development objectives. As explained by (Mckeown and Nolet, 2013), ESD in this study was not only 'about knowing' but it was also 'about doing' and 'valuing'. It was therefore, important in this study to consider variables such as quality curriculum content, effective teaching approaches and opportunities that added meaning to the curriculum. A model which was said to be a procedure or description of steps involved in the reorientation of the teacher education curriculum for sustainability was also taken into consideration. Ideal models as described in this study, give a clear picture of what sustainability means to the teacher education profession and the teacher education system as a whole. This illustration is shown in the conceptual framework of this study (figure 1).

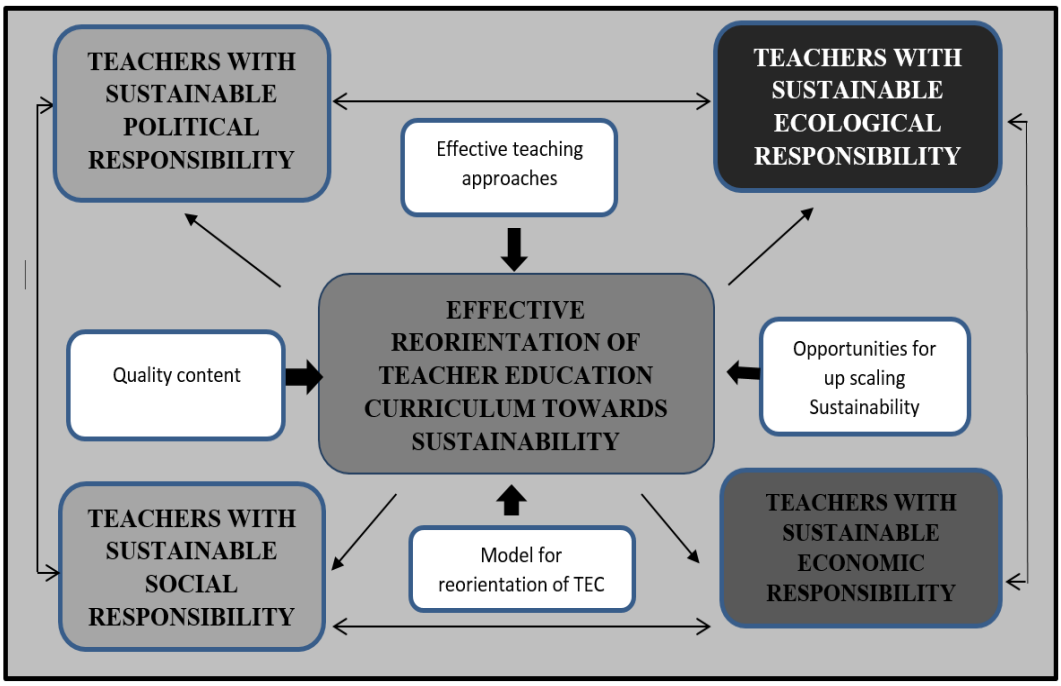


Figure 1: Conceptual Framework **Source:** Field data (2019)

1.9 Significance of the study

This study is likely to guide policy direction and help teacher educators at David Livingstone College of Education improve the process of reorienting the teacher education curriculum for sustainability. It is also hoped that the findings of this study might fill the gaps about knowledge on the reorientation of teacher education curriculum for sustainability in colleges of education in general and at David Livingstone College of education in particular.

1.10 Delimitations

The study on the quality of the reorientation of teacher education curriculum for sustainability was limited to David Livingstone College of Education in Southern Province of Zambia**.** It was an interdisciplinary study and it mainly focused on the: quality of curriculum content; effectiveness of the teaching approaches; potential opportunities and development of a model for quality reorientation of teacher education curriculum at David Livingstone College of Education

1.11 Organization of the Dissertation

In Chapter one, the researcher traced the historical background to the emergence of the reorientation of the teacher education curriculum as an educational response to the global sustainability challenges that threatened the well-being of the planet upon which lives depend. The theoretical and conceptual frameworks, which were adopted for this study, were also given and explained. The researcher further provided the significance, delimitation and the operational definitions of the study.

In Chapter two, the researcher presented literature review related to the quality of the reorientation of the teacher education curriculum for sustainability. It was presented thematically using the themes derived from the specific objectives of this study and this allowed the researcher identify the major gaps in the related literature.

In Chapter three, the methodology of this study was presented and explained in detail. The researcher in chapter four presented the main findings of the study thematically, and this chapter was followed by chapter five in which the researcher presented the discussion and analysis of the findings. Then, in Chapter six, the conclusion and recommendations of this study, as well as the proposed future areas of research, were given.

1.12 Summary

In this chapter, the researcher has provided the contextual background to the setting of the study and traced the emergence of the reorientation of teacher education curriculum for sustainability. This has given a general overview of attempts which were made to reorient teacher education curriculum for sustainability and as shown in this chapter, the overall picture of the quality of the reorientation of the teacher education curriculum for sustainability was still patchy, particularly at David Livingstone College of Education. The theoretical and conceptual frameworks, which were adopted for this study, have also been given and explained. The researcher further provided the significance, delimitation and the operational definitions of the study. Details on some of the issues raised in this chapter are given in the next chapter which reviews relevant literature on the studies related to the quality of the reorientation of the pre-service teacher education curriculum for sustainability in colleges of education.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.1 Overview

In this chapter, the researcher presented review of literature related to the study which focused on the quality of the reorientation of the teacher education curriculum for sustainability in colleges of education according to the four themes derived from the specific objectives of the study. These are: the quality of the curriculum content, effective teaching approaches, opportunities for up-scaling sustainability and a model for quality reorientation of teacher education curriculum towards sustainability at David Livingstone College of education. It will begin with an overview of the concept of teacher education in relation to sustainability in the Zambian contexts.

2.2 Teacher education and training in relation to sustainability

The quality of any education system depends heavily on the quality of its teachers. In the movement towards sustainability, student teachers as learners in the world of change are empowered to take a form of action to exercise their social, ecological and economic responsibilities throughout their personal and career lives (UNESCO, 2014 & Tilbury, 2005). The approach to environmental sustainability teacher education and training according to UNEP & UNESCO (1985) is based on this distinction: teacher education for sustainability establishes sensitivity to environmental and sustainability issues, raising the level of awareness and generating commitment. It normally operates with a longer time frame than training which focuses on immediate application of knowledge and skills. Teacher training for sustainability teaching is for the development and mastering of skills and for the solution of practical problems and specialized actions (UNEP & UNESCO (1985). The major concern in this study was with the wider process of the teacher education which equips prospective teachers with the knowledge, attitudes, values and skills they require to promote sustainability in the classroom, schools and the wider community when they graduate.

Education designed to address sustainability issues is more than academic performance as it is not only about transfer of knowledge and skill enhancement, but the idea is to work with the target audience as they take charge of their own lives in a shared world of change through preparing them to plan for, cope with and find solutions to issues threatening their social, ecological, political and economic environment(s) (UNESCO, 2006). Teaching in the 21st century was not anymore viewed as a mere transmission of theories or facts to learners, but as

a multi-faceted phenomenon (Khan, 2012). According to Jacques Delors, the chair for the International Commission on Education for the 21st Century, in the report, *LEARNING: The treasure within*, released to UNESCO strongly, recommended that all education reform be conducted in the spirit and essence of sustainable development and calls for full-fledged pursuit of reorienting education to attain sustainability. Delors described education as a life-long perspective built on the five pillars of *learning to be*, *learning to do*, *learning to live together, learning to live with others;* that is learning to live together sustainably and from ESD Lens, learning *to transform self and society* (active citizenship, future thinking, responsible life-styles, sharing of resources and adaptability) (Delors, 1996).

However, quality teacher education deeply rooted in the cultural values and beliefs which influence the formulation of the target competencies in ESD. Where there is quality education, all the four functions of education: the vocational, socialization, liberalization and transformation which influence policy, theory and practice of any education reform, are well balanced in the perspective of (Sterling, 2011); concepts such as participation, responsiveness, relevance, flexibility, and praxis as key concepts associated with quality curriculum development operations are well defined and clarified in cultural terms as explained by (Namafe, 2006). While ESD was a global call to respond to critical global sustainability issues, the 'change and the sustainable future would never come about if people continued to dream and fret about global changes, world summits and international agreements. If teacher education as Palmer (1998) observed is a 'priority solution' in the transition towards sustainability, it is important to be learner-cantered in the reorientation of the teacher education for sustainability in colleges. Teachers as key figures in any education system should be well-informed and institution of learning should be viewed as important places where the sustainability professional educational needs of pre-service student teachers can be captured and addressed.

Sustainability issues such climate change were real issues in the 21st century and appeared the same on the surface, but their impacts varied from one country or institution to another leading to variations in education approaches. For instance, while the temperatures were predicted to rise by 4 degrees Celsius by 2100 globally, Southern Africa was predicted to face warmer temperatures than any other region in the world, with devastating effects on water and food security, health, biodiversity and human well-being among others (Nhamo & Shava, 2015). The key aspects that needed to be considered in higher education curriculum development processes according to UNEP (2006), included: introducing decentralized and

flexible management concepts; strengthening interactions with actors; improving the quality and efficiency of teaching and research and increasing relevancy of teaching.

In as much as Zambia endorsed the GAP-ESD and highly recognized ESD as one of the major issues of national concern in the 2013 Revised Teacher Education Curriculum Framework which heavily criticized teacher education of low quality and stressed the need to be learn-centered in the development of any education programme (Ministry of General Education, 2013), the related literature as it will be presented in this chapter, up to the time of this study was still silent on the quality of reorientation of the teacher education curriculum for sustainability in Zambian Colleges of Education. The GAP-ESD through its two objectives contributed to the movement towards the Agenda 2030 and the SDGs including SDG 4, which responded directly to the quality agendas in the transformation of the world towards sustainability. The researcher therefore, found it necessary to investigate the quality of the reorientation of the teacher education curriculum for sustainability at David Livingstone College of Education in the context of the Third Priority Action Area of the GAP-ESD.

The specific gaps that were identified in the related literature and addressed in this study were: the quality of the curriculum content; effectiveness of teaching approaches that lecturers were using and opportunities that existed for scaling-up the reorientation of the teacher education curriculum for sustainability as model for quality reorientation of the teacher education curriculum for sustainability at David Livingstone College of Education. In the next section, the researcher presented literature review related to the quality of curriculum content in reorienting the teacher education curriculum for sustainability.

2.3 Quality of teacher education curriculum content

In rethinking professional education curriculum content in the direction towards sustainability in higher education institutions, international ESD scholars such as Wright (2002& 2004) summarized some of the common principles and themes among the majority of institutional policies, national and international declarations on sustainability in higher education institutions and these included: developing ecological literacy; application of knowledge in solving sustainability challenges; sustainable physical operations; interdisciplinary curricular; public outreach; facilitation of information; pursuit of practical solution to sustainability problems and working collaboratively at global, regional and local levels.

Although an understanding of the subject matter is important in the preparation of pre-service teachers for sustainability teaching, Wright (2002 & 2004) did not consider the emergent and contextual nature of sustainability as some of the sustainability themes that emerged after the adoption of the GAP-ESD at the Rio + 20 Earth Summit held 2012 were captured. Therefore, the researcher in this study addressed this gap by situating the study in the context of the Third Priority Action Area of the GAP-ESD and the quality of ESD content was examined in the local cultural contexts of the target audience.

In the Australian context, Stern and Streiser (2006) in their empirical research project in the domain of natural sciences discovered that different areas of actions of teachers' competencies were needed. As stated, in the classroom pedagogical, psychological and didactic skills were vital, in the school and community. While team work and cooperation in the school development and public affairs played an important role. Such competencies were considered important in this study because ESD prepares professionals for action taking. ESD is interdisciplinary and action oriented, but that study by Stern and Streiser (2006) was confined in the domain of natural sciences. To fill such gaps, the researcher conducted an interdisciplinary study as the qualities of the ESD themes in all the courses across the teacher education curriculum were examined.

Another qualitative education action research cycle was undertaken by Gedzune (2012) in Finland in the context of implementing teacher education for sustainability and it focused on how pre-service teachers made sense of ethical and underpinnings of relationships between human, and the non-human natural world. In that study, Gedzune (2012) suggested that teacher education for sustainability should involve students in experience-based, reflexive and discursive inquiry into ethical underpinning of their being in the world and interacting with it. This was appreciated as teaching-learning process for sustainability is practical and it requires an ethic which has a sustainable living at its core and which consists of developing the target values of social responsibility, concern for others and living in harmony with nature (UNESCO, 2004). However, other key components of the ESD Framework were ignored. In this study, all these five components which included: values, issues, skills, knowledge and perspectives were considered as suggested by (Mckeown *et.al.,* 2002).

In Japan, qualitative study on continuous challenges faced by educators pursuing sustainability in their teaching was also carried out by Hansely (2017) with the intention to gain insights into what educators working in ESD saw as the purpose of their teaching, what

they hoped students would learn and how they dealt with and reflected on the complex issues and risks of sustainability. Data was collected through semi- structured interviews based on reflective questions. A reflection on the complex issues and risks of sustainability issues were vital, but it was not extended to pre-service student teachers in colleges of education. The researcher in this study examined the quality of curriculum content in the college of education contexts.

In Zambia, Chilufya (2014) undertook a research which focused on determining the extent to which environmental issues had been integrated in the Zambian 2013 science education curriculum in selected Junior Secondary Schools in the Central Province of Zambia. A mixed method approach was employed following a descriptive survey. The data was analyzed using content analysis and thematic analysis techniques. The results from this research work showed that the 3 pillars of sustainability were considered in the 2013 revised science curriculum and the ecological issues, social and economic and a bit on political issues. Being in Zambia, people were hopeful that, Chilufya (2014) would extend the study to the Zambian colleges of education and David Livingstone College of Education in particular. Chilufya (2014), in that descriptive survey only focused on the integration of environmental sustainability issues in the 2013 Revised Zambian Science Education Curriculum in selected junior secondary schools and not in all the disciplines.

The vision of the 2013 Zambian National Education Curriculum Reform was to provide quality long-life education for leaners at all levels which was accessible, inclusive and relevant to individual, national and global needs and value systems (Ministry of General Education, 2013). In relation to such national visions, the UNEP Foresight Report (2012) noted that: adapting to global change and attaining a green economy in the 21st century required a variety of capabilities and actions to update educational institutions to better meet educational needs for sustainability work. Indeed, sustainability issues or themes were critical in defining quality teacher education content which was relevant to the contemporary and future concerns of the Zambian society as it was elsewhere at the time of this study. As Avong, (2013) noted, an understanding of the subject matter is important in the preparation of student teachers for sustainability in that, if teachers were not well prepared for teaching, the performance of learners could be negatively affected in schools.

However, as evident in the review of related literature, little was known about the quality of the curriculum content in reorienting the teacher education curriculum for sustainability in the

Zambian colleges of education and cultural contexts of the target audience. The researcher addressed these weaknesses by examining the quality of curriculum content in reorienting the teacher education to address sustainability in the Zambian context and at David Livingstone College of Education in particular. In the next section, the researcher presented the literature review related to effective teaching approaches in reorienting the teacher education curriculum for sustainability.

2.4 Effective Teaching Approaches

Teaching for sustainability should not merely be about discussing solutions in order to enhance awareness, but also about active exploration of issues, identifying potential solutions and acting on them. Effective teaching approaches in ESD were those that contributed to the development of critical thinking skills, the capacity to make informed decisions, a sense of responsibility, respect for the opinion of others and integrated problem-solving skills among learners (Roarda, 2001). These characteristics were important for student teachers to engage in sustainability practices and actions in their preparation for sustainability, it was not clear whether or not such teaching approaches were assessed to determine their effectiveness in the context in the preparation of pre-service teachers for their future roles especially in colleges of education.

In the study that Kostova & Atasoy (2008) did a study on methods of successful learning in environmental education using statistical methods in environmental education and it revealed that effective teaching approaches were: learners working in groups; debating peer learning, competition project; work and cooperation; problem-solving; presentation; motivation and meaningful learning. Although environmental education is closely related to ESD, these two fields of study are different (Palmer, 1998). ESD addresses values, skills, knowledge, perspective and issues associated with sustainability which guide and motivate people to seek sustainable livelihoods, participate in a democratic society and live in a more sustainable manner (Mckeown, *et. al.*, 2002). It was, therefore, important to assess the effectiveness of the teaching approaches that were being used in reorienting the teacher education curriculum for sustainability in colleges of education.

In Taiwani, a research was conducted by Lin (1999) in which it was proposed that teaching required learner-centred activities in class using a mixed method approach to study a class of 18 students. The focus was on investigating the effectiveness of integrating learner -centred blogging approach into English as a foreign language writing in classroom. Although ESD is

learner-centered and interdisciplinary, the teaching approaches that were being used in reorienting the curriculum for sustainability were not captured and it was not extended to colleges of education in Zambia. To fill this gap, the researcher assessed the teaching approaches that were being used by lecturers in the reorientation of the teacher education curriculum for sustainability.

The 2013 Revised National Education Curriculum Framework heavily despises teaching and learning that is theoretical and bookish without opportunities for the hands-on practical experience (Ministry of General Education, 2013). However, a curriculum undergoes modifications in the process of being implemented in complex and naturally existing contexts (Cornbleth, 1990). Unfortunately, knowledge gap on the effectiveness of teaching approaches that were being used by lecturers in the Zambian colleges of education in reorienting the teacher education curriculum for sustainability in the related literature still existed up to the time of this study. The researcher in this study assessed the effectiveness of the teaching approaches that were being used in the reorientation of the teacher education curriculum for sustainability at David Livingstone College of Education. In the next section, literature review related to the opportunities for scaling-up ESD in the context of colleges of education was presented.

2.5 Potential Opportunities for scaling up ESD

The reorientation of the teacher education curriculum for sustainability becomes real when it is adapted to the classroom, correctly interpreted to learners and when it responds to sustainability issues in the local contexts. In higher institutions of learning, the study by Clugstone and Calder (2000) suggested that genuine reorientation of any professional education curriculum for sustainability was the inclusion of ESD themes in critical dimensions of institutional life such as: statements of mission and purpose, academic programmes, outreach, energy and purchasing practices. ESD occurs in all forms of education and it uses approaches such as whole-institutional approach, but that study was silent on the potential of such dimensions in scaling-up ESD in colleges of education in Zambia, as the study was confined in higher institutions outside Zambia. In this study, the researcher intended to establish the opportunities for scaling-up ESD in Zambian set-up and particularly at a College of Education.

Another study in Southern Africa titled ‘networking: Enabling Professional Development and Institutionalization of Environmental Education Courses in Southern Africa, was conducted

by Lupele (2007). The aim was to get insights on how networking enabled or constrained professional development and institutionalization of environmental education courses in Southern Africa in the context of Course Development Network, a project of the Development Community Regional Environmental Education Programme (SADC-REEP). It involved 12 institutions and relational philosophy informed the research process and methodology. The study by Lupele (2007) indicated that networking could provide support structures for social transformation and change in Environmental Education. However, it was conducted at regional level and it mainly focused on in-service teachers in the region, disregarding the networks and partnerships that were created to promote ESD in colleges of education in the context of the GAP-ESD. This study was located in GAP-ESD and the researcher was interested in establishing the potential opportunities for scaling-up ESD in colleges of education while considering the regional and global aspects.

Another study that was conducted by Ndum and Okey (2015) on teacher's involvement and roles in climate change and implementation in the Nigerian Secondary Education system discovered that teachers were mostly not involved in curriculum development, as they were just invited to implement the already designed curriculum. The recommendations in this study were that, such programmes should be initiated from the grassroots using bottom-up approaches and with full involvement of the teachers with vast experience. The development and implementation of climate change education and recommendations made were of great value because Zambia is one of the African countries where the impact of climate change was real and where the development of the teacher education curriculum was highly centralized. Although it was hoped that Ndum and Okey (2015) would extend the study to pre-service student teachers in colleges of education to establish the opportunities that existed for them to participate in the development ESD related programme, that study only targeted in-service teachers in the Nigerian School System. Therefore, it was the intent of this study to fill this gap.

In another study, Uitto & Solaranta (2017) investigated lower secondary school teachers as educators for sustainability in Finland. A survey was used to study the perceptions of 442 subject teachers from 49 schools and it was recommended that expertise of subject teachers should be taken into account in the teacher training and education. Although the study was of great value to this research, because perception is one of the five prescribed components of the ESD framework, Uitto & Solaranta (2017) did not venture into the exploration of how the opportunities that were created in the teacher education and training process could scale- up

ESD. This gap was addressed by exploring the opportunities that existed in all areas. Hence, in this study, the opportunities that exited in all three forms of the teacher education at David Livingstone Colleges of Education in this study were explored.

As indicated in chapter one, the fourth objective of this study was to propose a model based on the possible ways suggested for improving the quality of the reorientation of the teacher education curriculum for sustainability at David Livingstone Colleges of Education. This commenced with a review of literature related to ESD models as presented in the next section.

2.6 Model for Quality Reorientation

A model in this study refers to the procedure, approach or process involved in the development of the teacher education curriculum reoriented for sustainability. Such models in this study were viewed to be very important as they were a basis for institutions to compare and review sustainability practices in colleges of education. Shriberg (2002) confirmed this by arguing that 'assessment could help in operationalizing charters and policies on sustainability in higher education'. As evident in this review of literature related to models for quality reorientation of the teacher education curriculum for sustainability in colleges of education, a number of models for use in assessing sustainability efforts in higher education institutions were suggested and some of them included: the Sustainability Assessment Questionnaire (SAQ); Auditing Instrument for Sustainability in High Education (AISHE) and the Geographical Assessment of Sustainability in Universities (GASU) (Togo 2009 & University Leaders in Sustainability Forum -ULSF-1999)).

Although such assessment models covered critical dimensions of higher education such as curriculum, research and scholarship, operations, faculty and staff development rewards, outreach and service, student opportunities, institutional mission, structure and planning, they were not specific to the teaching profession as described by (ULSF-1999). They were also not specific to the quality agendas in the reorientation of the teacher education curriculum for sustainability in colleges of education and they did not cover or illustrate the interrelationship that exist between assessment of student gains in ESD and the: content, teaching approaches, learning environments, administration, planning, finance and other variables surrounding the development of the teacher education curriculum in colleges of education. Sustainability means different things to different professional groups leading to variations in assessment tasks and therefore, such models could not be generalized.

For instance, in South Africa, a case study was undertaken by Togo (2009) in the context of Mainstreaming of Environmental and Sustainability into African (MESA) University Project at Rhodes University, suggested a 'University-based Sustainability Assessment Tool' (USAT) which was to collected as part of the study through interviews and observation. Although the study by Togo (2009) greatly contributed to the systematic approaches in the mainstreaming of sustainability challenges in university functions and operations which emphasizes the interdependencies of phenomena, other stages of curriculum development were not considered. It was also not specifically designed to assess the preparation of the pre-service teacher for sustainability teaching colleges of education. In this study, a model proposed covers all the stages of curriculum development.

The study conducted by Elmose and Roth (2005) formulated the following as key competencies for living in a risk society: Competency to understand and change one's own living conditions and participate in collective decisions and solidary with those who are unable to control their own conditions. Drawing on the study that Elmose and Roth (2005) did, Bertschy *et.al*., (2013) proposed two competence-based models which clarified the target competences for the audience in the United States of America set-up. The first model was the Curriculum, Sustainable Development Competencies, and Teacher Training (CSCT), which was developed through collaboration of members of fifteen European Universities. That model touched professional and personal life of teachers and viewed ESD in the context of living in a risk society. The second model was called Competency in ESD and was designed by an international group of experts to show competency catalogue whose audience was educators in general.

In those two models, Bertschy, Kunzil & Lehmann (2013) clearly clarified the teaching professional competencies that should be targeted in the preparation of teacher for sustainability teaching without considering the cultural contextual metaphors which describe the characteristics of the teachers' work environment (s). They also did not relate the action competency to subject knowledge and other variables which determined the actions that teachers take. According to Biggs (2003), any education curriculum was designed so that the content; learning activities and assessment tasks are aligned to the learning outcomes that are intended in the programme.

The main issues that came out of this review were that: the models suggested by most of the previous scholars were not covering the whole process of reorienting the teacher education

curriculum for sustainability. Reorientation of the teacher education curriculum for sustainability takes place at all the stages of curriculum development and it covers all the aspects of teacher education system such as planning, policy development, programme implementation, finance, curriculum, teaching, learning, assessment and administration (UNESCO, 2012). In the model proposed, therefore, the researcher considered the quality inputs and instructional processes that would enable learners in colleges of education to acquire relevant knowledge, values, skills and competences. It also recognized the interrelationships and interdependence among: planning, administration, aims, and content, learning environments, teaching approaches and assessments tasks, with key indicators of quality agendas in the reorientation of the teacher education curriculum for sustainability at David Livingstone College of Education (details in section 5.5). The researcher considered some of the recommendation made by Togo (2009) of situating ESD in the local cultures and adopting a system-wide approach.

2.7 The research gap addressed and directions from related literature reviewed

This chapter provided a review of literature related to this study. It traced the quality ESD content, effective teaching approaches, opportunities for scaling-up ESD and model for quality reorientation of the teacher educational curriculum for sustainability, but as evident, up to the time of this study, no attempts had been made in Zambia to investigate the quality of the reorientation of teacher education curriculum for sustainability in colleges of education and at David Livingstone College of Education in particular. There was also no model that had been proposed for quality reorientation of teacher education curriculum to address sustainability that covered all the stages of curriculum development process.

To address this knowledge gap, the researcher in this study investigated the quality of the reorientation of the teacher education curriculum to address sustainability at David Livingstone College of Education. Based on the themes raised, a model for quality reorientation of the teacher education curriculum for sustainability at David Livingstone College of Education was also proposed in this study. This study as stated was influenced by the objectives of the Global Action programme on ESD which was developed at the 20th Anniversary of the Rio Earth Summit in 2012, to scale-up ESD in all areas and forms of education. The researcher in the next chapter presents the methodology that was employed in this study.

CHAPTER THREE: METHODOLOGY

3.1 Overview

In the previous chapter, the researcher reviewed literature related to this study. In this chapter, the researcher describes the methodology of the study. It will include the philosophical dialogue research design, study site, target population, sample, size, sampling techniques, data collection instruments, validity and reliability, data collection procedure and analysis.

3.2 Research Design

The research approach for this study was qualitative and specifically a phenomenological research design was employed as the focus was on the meaning regarding the quality of the reorientation of the teacher education curriculum for sustainability and it involved participants who have had lived experiences (Moustaka1994). This approach helped to determine what that experience meant for the participants, as they were able to provide a comprehensive description of it. This allowed for intensive analysis of the nature and complexity of this phenomenon in the natural setting at David Livingstone College of Education.

3.3 Study site

The study was interdisciplinary and it was conducted at David Livingstone College of Education, which is located in Livingstone, the tourist capital of Zambia. The institution was established in 1959 during the colonial period by the Council of Christian Churches in Northern Rhodesia (now Zambia) to train primary school teachers. At the time of this study, the college was offering secondary and early childhood teachers diploma programmes and it was also in the process of introducing teacher education degree programmes by distance learning. The college was still being managed jointly by the Christian Churches Council of Zambia (CCCZ) and the Government of the Republic of Zambia (GRZ) through the Ministry of Sciences, Social Sciences, Languages, and Mathematics and Expressive arts. This college was suitable for the study because it was one of the colleges where attempts to reorient teacher education curriculum towards sustainability were done by the Ministry of Education and Zambian National Commission for UNESCO in 2013, but the quality of such efforts had not been investigated since then. Other colleges of education where attempts were made to

reorient teacher education towards sustainability in Zambia were; Kitwe, Chipata, Charles Lwanga, Mufurila, Sowlezi, Mansa and Kasama colleges of education (UNESCO, 2013)

3.4 Target Population

The target population of this study included all the Principal Education Officers from the Directorate of Teacher Education and Specialised Services (TESS) and Educators from the Zambian National Commission for UNESCO. David Livingstone College of Education Administrators, all the Heads of Departments, Lecturers and Students were also part of the target population.

3.5 Sample Size

This research had an initial sample size of 41 participants who included; 6 Heads of Departments, 8 Lecturers and 20 Students from David Livingstone College of Education, 2 officials from UNESCO and 3 officers from TESS. However, the total number of those who participated was thirty-five (35).

3.6 Sampling Techniques

In selecting the sample, a type of purposive sampling called expert purposive sampling was used to select participants from TESS and UNESCO. This technique was applicable because their expertise was required in this study which aimed at investigating the quality of the reorientation of the teacher education curriculum for sustainability at David Livingstone College of Education. Lecturers and Heads of Departments at David Livingstone College of Education were selected using expert and heterogeneous purposive sampling because they are experts and they were drawn from different departments. On the other hand, heterogeneous purposive sampling was used to select students at David Livingstone College of Education because students were specifically selected from different areas of specialization (Content Courses) at each levels of their study.

3.7 Data Collection instruments

In this study, semi-structured interview guides and observation checklists were used as primary data collection instruments, while content analysis was used to collect necessary secondary data.

3.7.1 Semi-structured interviews

In this study, semi-structured interviews were conducted via verbal interaction with participants. The researcher had a planned set of questions called an interview guide which was used (Bernard, 2002). Emerging questions were also given time despite them being outside the interview guide. The interviews with the participants from TESS and administrators from David Livingstone college of education administration mainly focused on the teacher education programmes, plans and policies associated with the quality reorientation of teacher education for sustainability at David Livingstone (appendix iv).

Other participants who were interviewed were the; Heads of Departments, Lecturers (appendix v) and Students (appendix vi) at David Livingstone College of Education on the quality of teacher education curriculum content, teaching approaches which were being used by lecturers in reorienting teacher education curriculum towards sustainability and potential opportunities for up scaling education for sustainability in departments and the college as a whole. The Heads of Departments and Lecturers were interviewed because they were experts in this area and directly involved in designing, implementing and evaluating teacher education curriculum. Students were interviewed because they were the beneficiaries of the teacher education curriculum which was reoriented for sustainability.

Most of the interviews were face to face, except for one which was done through telephone with the Head of Department and some were group interviews with students (mostly first years). Some responses were tape recorded with permission and the researcher was also taking notes during interviews. Participation in interviews was voluntary and participants chose the time and place for the interviews.

3.7.2 Observation checklist

Data was also collected through observation the systematic recording of observable or phenomenon in a natural setting (Clayton, 2005). In this study, the researcher observed the effectiveness of the teaching approaches that were being used by lecturers in reorienting the teacher education curriculum for sustainability. The focus was on all the three dimensions of the curriculum which are formal, non-formal and informal. The researcher also observed how sustainability concerns were being integrated in all the disciplines across the curriculum and daily operations of the college. Furthermore, potential opportunities for scaling up the reorientation of the teacher education curriculum for sustainability were also established through observation.

During observations, an observation checklist was used and it contained questions soliciting information on the effectiveness of the quality of ESD content and teaching approaches which were being used by lecturers in reorienting the teacher education curriculum towards sustainability. It also contained questions soliciting information on the potential opportunities that existed for scaling-up the reorientation of teacher education curriculum for sustainability at DALICE. The researcher had a note book to keep records of important and salient events of the process of reorienting the teacher education curriculum for sustainability. The events which were recorded are those that the researcher thought had a bearing on the research question or process.

This helped the researcher obtain relevant information on the 'whole picture' of the quality of the reorientation of teacher education towards sustainability at David Livingstone College of Education in a natural setting (see appendix iii).

3.7.3 Document review

Data was also generated through document review. Among the documents that were reviewed were the; National Education Policy 'Educating our Future', the 2013 Revised Education Curriculum Framework, David Livingstone College Historical records, syllabi, course outlines and past examination papers, as well as the UN guidelines for reorienting teacher education to address sustainability documents, Global Action Programme on ESD Roadmap and UNESCO global reports on ESD case studies.

This helped the researcher verify the information that was generated through interviews and observation, especially on quality of curriculum content in reorienting the teacher education towards sustainability and teaching approaches that were being used by lecturers at David Livingstone College of Education. Document review of related literature also helped the researcher obtain useful information on how to develop a holistic model for effective reorientation of teacher education curriculum for sustainability at David Livingstone College of Education.

3.8 Validity and Reliability

In this research, validity was maintained using triangulation which means that there are multiple sources of information, multiple methods of collecting information and multiple forms of information. To confirm the results of this study and to enhance credibility, the researcher used different sources and methods of data generation. The methods which were

used included; interviews, content analysis and observation checklists. The participants were also drawn from different departments as the study was interdisciplinary in nature.

3.9 Data Collection procedures

Data collection procedures according to Creswell (2009) include setting the boundaries for the study and collection procedure as well as the steps taken in gathering of information to answer the research questions. In this study, the following data collection procedure was followed. Firstly, the University of Zambia School of education through the Assistant Dean Post- Graduate Studies granted the researcher permission to carry out a study. Then, permission was sought from the Principal and Heads of Departments at David Livingstone College of Education, as well as from UNESCO and TESS Directors to conduct a study. Almost a month was spent in the field collecting data and during this study, participation was voluntary as the researcher did not force the target population to participate. Data from interviews was recorded in a note book and tape recorded.

3.10 Data Analysis

Data analysis is defined by Sidhu (2014:276) as "breaking down of existing complex factors into simpler parts and putting the parts together in new arrangements for purposes of interpretation". While Ghosh (2013) stated that there is no single methodology which is universally applicable for the purpose of analysis of qualitative data, what determine the methodology are the research objectives. To meet the various objectives of the study and the research instruments which were used during the study, different methodologies of data analysis were used. A semi-structured interview was analyzed qualitatively using thematic analysis. Valsiner (2006) explained that thematic analysis involves the researcher looking for related themes, describing the information in themes and patterns exclusive to that set of participants. In this context, theming means putting data into identifiable themes and categories after which interpretations and discussions were done (thematic analysis), (Kothari, 2004).

In this study, the researcher critically read through transcripts from semi-structured interviews. Codes were then developed and grouped based on interconnections to form categories (Dey, 1993). Labeling of categories was done in order to develop theoretical meanings that were used for data interpretation and drawing of the study. In this study,

thematic analysis not based on pre-described themes but emerging themes from the data or what could be termed us group-up process was used (O' Leary, 2004).

Data from document review was analyzed through the use of content analysis. The researcher used analytical constructs, or rules of inference, to move from the text to the answers to the research questions. In this study, the researcher analyzed the vital text on the effectiveness of reorientation of teacher education for sustainability at David Livingstone. This provided answers to the research questions.

3.11 Ethical Consideration

Ethics are defined by Resnik (2011) as rules for distinguishing between right and wrong. Some of the reasons for adhering to ethical norms in research are promotion of the aims of research, as well as the values that are essential to collaborative work, such as mutual respect, trust and accountability. During this study, data collection only commenced after negotiating access at the Zambian Commission for UNESCO, Directorate of TESS and David Livingstone College of Education Administration. All the Heads of the identified departments agreed to participate in the study and participation was on a voluntary basis where participants had the right to withdraw at any time. All those who participated were briefed about the purpose of the study and their roles as participants. Written consent was obtained from all of them and their rights to privacy, confidentiality and autonomy were highly respected. The researcher also safeguarded individual identity and the data that was collected was treated with utmost confidentiality (appendix 1).

3.12 Summary

In this chapter, the research process of this study has been discussed and as indicated, the researcher used qualitative phenomenological approach whose objective is to fully understand the essence of some phenomenon. The researcher has also given details on how the participants were selected using heterogeneous and expert purposive sampling methods. Furthermore, the details on the sources of data which included semi-structured interviews, observation checklists and document review, have been provided. The researcher ended the chapter with highlights on thematic and content analysis as the techniques that were used to analyze data, validation of data which was based on triangulation and ethical procedures which guided the study. In the next chapter, the focus will be on the findings of the study.

CHAPTER FOUR: FINDINGS

4.1 Overview

In this chapter, the researcher presented the findings of the research that focused on investigating the effectiveness of the reorientation of the teacher education curriculum for sustainability at David Livingstone College of Education. The results are based on the data that was collected through document review, observation and interviews with the officials from the Zambian Commission for UNESCO, Directorate of Teacher Education and Specialised Services (TESS), as well as administrators, lecturers and students at David Livingstone College of Education. The findings were presented according to the themes that emerged from each specific research objective. These research objectives were to:

1. examine the quality of curriculum content in reorienting teacher education curriculum to address sustainability at David Livingstone College of Education.
2. assess the effectiveness of the teaching approaches which were being used by lecturers in reorienting teacher education curriculum towards sustainability at David Livingstone College of Education.
3. establish potential opportunities that existed for up scaling the reorientation of teacher education to address sustainability at David Livingstone College of Education.
4. develop a model for quality reorientation of the teacher education to address sustainability at David Livingstone College of Education.

4.2 Demographics of Participants

The data presented below is about 35 participants. 3 were Senior Teacher Education Standards Officers from TESS (2 males and 1 female) and 1 female participant from the Zambian commission for UNESCO from education department. Other participants were: 4 Heads of Departments at David Livingstone College of education (3 males and 1 female); 8 Lecturers (6 males and two female) and 20 Students (12 males and 8 female). The total number of participants was 35.

4.3 The quality of the curriculum content

The first objective was to examine the quality of the curriculum content in reorienting the teacher education curriculum to address sustainability at David Livingstone College of Education. To achieve this objective, the researcher obtained data through content analysis of the course materials in all the departments and also interviewed Heads of Departments,

Lecturers and students from all the departments. This was in line with research question one which read as 'how was the quality of curriculum content in the reorienting the teacher education towards sustainability at David Livingstone College of Education?' The main themes that emerged from the study were as follows:

4.3.1 Inclusion of Sustainability issues in the Curriculum

Through content analysis of the 2013 Revised National Teacher Education Curriculum Framework, it was revealed that ESD was identified as one of the issues of national concern (appendix ii part one). Other issues of national concern that were incorporated were: Environmental Education, Special Education, Life-skills, Governance, Gender, Human rights, Guidance and Counseling, Entrepreneurship Education, HIV-AIDS, Health, Information and Communication Technology (ICT), Population and Computer Studies**.**

While it was clear that ESD and other issues of national concern were integrated with a view to developing the student teachers holistically, the content analysis of syllabi and course outlines indicated that the integration of sustainability issues was not well balanced in the departments**.** Quality sustainability content is shaped by the three main dimensions of sustainability which are social, ecological and economic, but, the data showed variation in the ways in which the three main dimensions of sustainability issues were integrated. It seemed that the inclusion of sustainability concerns was influenced by the focus of the disciplines. For example; Business Studies Department mainly focused on economic sustainability aspects and social sciences focused on social sustainability aspects. In the Agriculture, department all the three dimensions of sustainability were captured but the content was too low to adequately prepare student teachers for sustainability teaching. The most popular dimension in the entire Department according to the findings was social and the least was ecological.

As a way of improving the quality of the curriculum content, this study suggested that the curriculum should have an interdisciplinary view, with all the courses addressing all the major dimensions. These three main pillars of sustainability are a powerful tool for defining sustainability holistically. The interviews with the lecturers also showed that the sustainability curriculum content was not balanced in the courses. When lecturers were asked to give a general comment on the integration of sustainability concerns in the curriculum (refer to appendix iv), one of the Heads of Departments and key informant responded that:

> *I just heard about the ESD recently when I attended a workshop. Many members of staff did not know that ESD is for everyone. When officials from UNESCO donated money for tree-planting, we did not know who to involve. We tried Social Sciences, but they were no longer offering Geography. So we decided to give the money to the Agriculture Department because they have courses related to tree-planting.*

When asked the same question, a lecturer from Agriculture Department had this to say:

> *ESD is good because it links the college to the community, but its effect is not felt.*

It was so clear that the interdisciplinary nature of ESD was not considered and that the content was not well balanced. ESD is holistic and interdisciplinary and depends on concepts and analytical tools from a variety of disciplines. Addressing one or two dimensions is an incomprehensive way of addressing sustainability issues as it did not help learners to appreciate the interdependent and interrelatedness of the said dimensions. In such a situation, its impact cannot be felt as revealed by the results of this study.

4.3.2 Low levels of awareness about Education for sustainability

To find out how each department contributed to the achievement of sustainability, lecturers and Heads of Departments were asked to explain how education for sustainability was being delivered in their departments (appendix iv). Their responses generally showed that the level of awareness was low as most of them seemed not to be familiar with the key concepts used in ESD. One of the lecturers from Expressive Arts Department confirmed this by indicating that:

> *We know some of these things and we just teach them without realizing that they are aspects of sustainability.*

It was interesting to discover that some lecturers were using the terms such as *tolerance, respect, democracy, culture diversity*…. without realizing that the terms were associated with sustainability. Identification and understanding of sustainability concerns integrated in the curriculum is important as it determines the action that educators take. At implementation stage, the curriculum which is reoriented towards sustainability is modified to fit the conditions of the local environment.

The interview with the students also revealed that, the level of sustainability awareness was also low among the students as most of them were not familiar with the key concepts used in ESD. For example, during interviews, students were asked to define the concept 'sustainable development' as a way of examining the effectiveness of the content in reorienting the teacher education curriculum for sustainability (refer to appendix v-question 1). None of them gave the definition which is widely used (the development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs).

The students were also asked to state any theme associated with sustainability that they had covered in their areas of specialization, students from agriculture department were able to identify sustainability topics such as conservation *farming, agroforestry'* and *agri-busines*s. In other departments, the students only identified the themes after the researcher defined the key term 'sustainable development'. From Business studies, students identified entrepreneurship and pollution associated with industries.

This shows that integrating sustainability concerns in the curriculum is not a guarantee that learning for sustainability takes place in an effective way. What is important according to the results of this study is the internalization of what is being taught.

4.3.3 Teaching Professional Competencies in Education for Sustainability

Through content analysis of the 2013 Revised Teacher Education Curriculum Framework, it was also found that the courses under Junior Secondary Teacher Diploma programme were in two categories. These were the teacher education category which is also called profession and the content courses. The teaching professional category comprised courses which were meant to prepare students for their future roles as teachers and these courses were compulsory to all students under Junior Secondary Teacher's Diploma Programme. According to the findings, the new courses were added to this category as a way of making the curriculum responsive to the professional needs of the student teachers and society. The new courses were: Communication and Study Skills, Special Education, Information Communication and Technology (ICT), Education Research, Computer Studies and Guidance and Counseling, Curriculum Studies, Education Leadership and Management and Entrepreneurship Education and Training.

Although this seemed to be a step towards sustainability, content analysis of the course materials showed that, professional competences in education were clarified, but in education

for sustainable development were not clarified. Education for sustainability prepares student teachers not only for their classroom work, but also community work. The curriculum which is effectively reoriented for sustainability focuses on both competences in teacher education and in education for sustainability.

The content category (areas of specialization) comprised courses which were meant to prepare students for their roles as subject teachers. In this category, students were expected to specialize in two courses of their choice which were linked to the junior secondary school curriculum. As observed, the aspect of pedagogical knowledge in the preparation of the teachers for sustainability teaching was ignored in the courses. This aspect is one of the determinants for effective preparation of teachers for sustainability teaching. For example, through content analysis of the 2013 Revised Mathematics syllabus, it was found that the key competences for the Mathematics Junior Secondary Teachers' Diploma Course were as follows:

1. *Demonstration of the ability to use concrete and semi-concrete materials to teach mathematic.*
2. *Demonstration of the ability to teach learner-centred lessons effectively.*
3. *Application of Mathematical Knowledge and skill in everyday life and understand information that is presented in mathematical form.*
4. *Demonstration of the ability to understand mathematical concepts and solve problems in everyday life.*
5. *Exhibition of creativeness, self-confidence, logical and critical reasoning strategies, inquiry and decision making skills.*

The process of producing competent teachers in education for sustainability involves acquiring knowledge and skills through practice, study or information, but the focus as revealed by this study through content analysis of the syllabi was mainly on preparing student teachers for their roles as subject teachers. According to the findings of this study, the aim of integrating sustainability concerns into pre-service is to improve the ability of the faculty to teach sustainability. This involves building the capacity of student teachers as change agents on relevant issues related to sustainability, as well as teaching and learning methodologies.

The idea of learning should focus on integrative competences required in professional life not only in class but also in the community.

4.3.4 Weaving ESD in the Local Culture and College Vision

According to the data obtained through content analysis of ESD literature and college records, this study further indicated that the curriculum content in ESD addresses values, skills, knowledge, perspectives and issues that guide and motivate people to seek sustainable livelihoods, participate in a democratic society and live in a more sustainable manner. In institutions of learning, this is usually reflected in the aims or mission statements which reveal what the local education community stand for. Unfortunately, the vision of the college was not considered and ESD was situated in the college cultural contexts. David Livingstone College of Education was developed with the aim that summarizes the college life as follows:

> *In order to achieve our aims, the college will offer direct practical experience of all it teaches. Every theory taught in the classroom will be tested in teaching practice. Every lesson taught in the chapel will be tested in the way we live together as a community. We may often fail, but we shall try to help each other to achieve the aim of creating a community in which the spirit of Christian living is the pervading factor, and which will reach out to our neighbors in Livingstone and, after we leave, to every part of Zambia.*

It was so clear that the top-down approach that was used negatively affected the implementation of the ESD as the specific needs of the students in their cultural contexts were not captured. This was reflected in the responses that lecturers gave when they were asked to comment on how responsive the curriculum was to the local sustainability issues (appendix iv). Some of the responses were as follows;

A lecturer of Social Science explained that:

> *This curriculum is far from being sustainable. The University of Zambia (UNZA) curriculum was even better because we had subjects like geography which addressed the environmental issues, not this Examinations Council of Zambia (ECZ) curriculum. ……Some of the social and economic issues are addressed in Social Studies.*

In trying to give more details, other lecturers gave a comparison of the ESD programme to other curricular elsewhere by commenting that:

> *This programme is well established in developed countries where they respond to issues like climate change, not in developing countries…*

It was also clear that ESD which was presented in more globalized manner did not add meaning to the life of student teachers as it was understood in the local cultural contexts. For example, when students were asked to explain how relevant ESD was to their personal and professional lives (appendix v), one of the students from Business Studies department complained that:

> *We work too much; when we graduate we will not even do this work. They should employ general workers….*

The results have shown that efforts were made to include sustainability concerns in the teacher education curriculum, but with gaps. The major gaps were in the way the curriculum content was designed to build the capacity of student teachers as change agents, on relevant issues related to sustainable development and appropriateness of the teaching and learning methodologies. The analysis indicated a weak version of integrating sustainability concerns in the teacher education curriculum. Most of the suggestions which were raised pointed to the need to situate ESD in the local cultural contexts.

4.4. Effective Teaching Approaches

Education for sustainability requires a choice variety of teaching approaches adapted to the audience, learning objectives and content. In a bid to assess the effectiveness of the teaching approaches that were being used to reorient the teacher education curriculum for sustainability, the researcher observed some lessons in some departments using a checklist (appendix, ii par two). The researcher also obtained data through content analysis of course materials and interviews with lecturers and students (Appendices iv & v- refer to research question 2).

4.4.1 Information dissemination

In the lessons observed using a checklist, it was revealed that a lecture accompanied by brief explanation was the most frequent teaching approach used in reorienting the teacher

education curriculum for sustainability particularly when teaching professional courses. These courses were compulsory to all the students. When lecturers were asked to comment on the effectiveness of the teaching approaches that were being used (appendix iv), some of them felt that the lecture was effective for information dissemination, especially at tertiary level and when handling a big number of students. For example, one of them said that:

> *We cannot use other methods because of the level of our learners, the classes are big. The teaching approach one uses is determined by the number of students and the level of their education.*

Although some of them felt that the lecture method was effective, it was observed that, the opportunities for students to ask questions during lessons were limited. This was captured from the response that one of students from Business Studies Department gave during interviews when they were asked to comment on the effectiveness of the teaching approaches that were being used to reorient the curriculum to address sustainability (appendix v). Her response was that:

> *They should be organising field trips to the industries so that we can learn more about the impact of these issues on the environment. We learn about pollution in our department, but we have never gone out to learn more about pollution*.

Although the lecture was frequently used to reorient the teacher education curriculum for sustainability, there were few opportunities of evaluating what was being presented at the end of such lectures. It was evident that the major concern was knowledge transmission through rote learning. This was not consistent with what was advocated for in the international ESD related literature and the 2013 Revised National Education Curriculum Framework.

4.4.2 Indigenous Teaching Approaches

Since ESD occurred in informal, formal and non-formal education and focused on the local social, economic and ecological cultural aspects, it was important in this study to find out whether or not the indigenous teaching approaches were being used to reorient the teacher education curriculum for sustainability. Through content analysis of course materials, observation and interviews with lecturers and students, it was established that, indigenous teaching approaches were being used to reorient the teacher education curriculum for

sustainability at David Livingstone College of Education. The interview with lecturers and students showed that the traditional approaches such as: Role-play, case studies games, demonstration, drama, dances proverbs, stories, songs and poetry were being used as a way of situating the preparation of student teachers for their roles.

When students were asked to comment on the effectiveness of some of the indigenous teaching approaches that were being used in reorienting the teacher education for sustainability (appendix v), a student from Social Sciences Department indicated that:

> *Stories especially in History can help us to learn about sustainability issues that affected people in the past and help us to address the current issues.*

When asked the same question, another student from Languages Department positively respondent that:

> *Indigenous ways of teaching and learning such as family life, stories, demonstration, drama and role play are good. For example, drama and role play help us to pretend to be in that situation*

A student from Agriculture Department also explained:

> *Our lecturers use traditional methods such as 'learning by doing methods' through projects and experiments. These help us to discover something new.*

These responses students gave were closely related to the comments lecturers made when asked to comment on the teaching approaches that were being used to reorient the teacher education curriculum for sustainability in their departments (appendix iv). One of the lecturers from Expressive Arts said that:

> *We raise awareness using themes on sports day. This year (2017) the theme for inter college is 'Embracing Fairness, Respect and Tolerance to Reveal Character Through sports. We also plant trees near the sports field and we have also adopted indigenous Southern African games such as 'chiyenga'*

Another lecturer indicated that*:*

> *We use teaching approaches such as songs, drama and poetry to raise awareness. The college choir members through music spread the gospel in the community and when they graduate some become chaplains or choir masters in school.*

According to the interview, themes helped to raise awareness among students and the general public. As observed such indigenous teaching approaches help to situate the teaching and learning process within their cultural contexts. The data obtained through content analysis of the ESD documents showed that indigenous teaching approaches provide many learning opportunities as they allow learners to learn by doing and through experience. Through interviews with lecturers, it was also revealed that these approaches can be more effective if they are combined with other approaches.

4.4.3 Participatory Teaching Approaches

Through lesson observations (appendix ii, part two) and interviews with the students in the departments, this study revealed that participatory teaching approaches were being used in departments when teaching content courses (areas of specialization). Participatory approaches are used in a situation where a number of people come together to resolve the identified problem. Some of the participatory approaches that were frequently used in the departments according to the interviews were: peer teaching, presentations, group discussions, observation, experiments, projects, and demonstration. According to the observation, these approaches encouraged students to think for themselves rather than passively receive information from lecturers.

Demonstrations, peer teaching, observation and presentations, as observed helped students learn together through practice and interaction. When students were asked to comment on the effectiveness of the teaching approaches that were adopted to reorient the teacher education curriculum for sustainability, one of the students interviewed indicated that:

> *We use peer teaching and demonstrations when preparing students for teaching practice. Lecturers demonstrate in class and some observe lecturers at Mujala Demonstration School.*

According to observation, peer teaching and presentations in departments were followed by discussions based on the lessons or topics presented by students. Students also observed the lecturers in class at college and serving teachers at Mujala Demonstration School which is located within the college campus. Mujala Demonstration School, according to the interviews with a key informant, was a 'brain child' of David Livingstone College which was opened in 1970 to provide practical teaching and real learning situations. Student teachers were taken to observe subject teachers. Individual students were also assigned to demonstrate and at the end of each demonstration, lecturers and students held a discussion of the lesson.

Although these exposed learners to real teaching situation, teaching for sustainability was not mainly considered as an extra-curricular even at Mujala Demonstration School. The projects associated with ESD such as production unit projects (gardening, cattle rearing, piggery and poultry), ground greening and beautification and anti-littering campaign at college, were also not taken seriously by some students. The participatory teaching approaches according to the results, allow learners to learn by doing and through experience. Generally, the study revealed that participatory approaches provide students with a framework of skills that they can use in any situation to explore sustainability issues and take actions for sustainability.

In this section, the researcher presented the findings on the effectiveness of the teaching approaches that were being used to reorient the teacher education curriculum for sustainability. The most effective approaches as presented were those that allowed students to go through a complete process of learning for sustainability and the main themes raised were action-oriented, field-based and theory-based. It was also clear that such approaches could make the teaching and learning process more active as ESD was found to be situated in the cultural context of the learners.

4.5 Potential Opportunities for Scaling-up the Reorientation of the Curriculum

In order to establish the potential opportunities that existed for scaling up the reorientation of the teacher education curriculum for sustainability, the researcher used observed the daily operations of the college using an observation checklist (appendix ii) and conducted interviews with Lecturers and Heads of Departments. The main themes that were merged from this study are presented below:

4.5.1 Creation of a Community of Learners and Teacher Educators

The following potential opportunities were captured in the responses that lecturers and Heads of departments gave when asked to state the potential opportunities that existed in the departments for scaling up the reorientation of the teacher education curriculum for sustainability (appendix iv question three):

i. Training of the teacher educators and policy makers to ensure that everyone understands how to contribute to the overall effort;
ii. Development of a national policy on ESD with clear guidelines;
iii. Mobilization of resources (material, human and financial);
iv. Establishment of coordination committees so that the impact of ESD can be felt at all levels;
v. Integration of sustainability concerns in the local examinations;
vi. Multi-stakeholder partnerships and networks ;
vii. Clarifying the aim of reorienting the teacher education curriculum for sustainability ;
viii. Redesigning the courses.

For example, some lecturers felt that they were in the right position to initiate the programme (ESD) because they are closer to the beneficiaries than the policy makers and Examination Council of Zambia. One of the Lecturers interviewed from the Social Sciences Department said that:

> *They should learn to consult before making decisions, no one owns the idea. The Examinations Council of Zambia officials came to consult us after they had already decided and they only consulted on other issues not on the reorientation of the teacher education for sustainability. We own the curriculum; they should not be dictating …. We know the needs of our students.*

It was clear that the whole-system approach which allowed all the key actors to participate as learners and educators throughout the process of reorienting the teacher education curriculum for sustainability was needed.

4.5.2. Development of A Specific Policy with Clear Guidelines

In addition to the above, it was further established that strategies to sustain and increase political support for ESD at all levels was yet another strategy for moving forward towards sustainability. Additionally, the following were other potential opportunities for scaling up the reorientation of the teacher education curriculum for sustainability (appendix ii part three):

i) Holding workshops and seminars for students per term to cement what they learn through formal system;
ii) Transforming student groups such as the Christian Council life and subject associations towards sustainability;
iii) Integrating sustainability concerns in the mission statements, strategic plans and generally in the daily operations of the college;
iv) Intensifying monitoring and evaluation of the ESD related activities;
v) Conducting sustainability situation analysis so as to capture areas that needed more attention;
vi) Introducing ESD as a separate course so that its impact can be felt;
vii) Promoting the use of the teaching approaches that were highly participatory and situate learning within the cultural contexts; and
viii) Development of sustainability management tools.

4.5.3. In the Examination System

The results through observation and content analysis of the ESD related documents, established that actors throughout the process of curriculum development needed sustainability management tools. This process, according to the findings, is too technical and ESD materials at the time of this study were lacking information on the local context. Sustainability management tools guide actors on how to reorient the curriculum at each stage of curriculum development. As indicated by the data obtained through content analysis of the course materials, the actors needed simple tools to guide them when designing, implementing and evaluating sustainability related programmes at all the stages of curriculum development. ESD related activities that needed sustainability management tools included the following:

a. Comprehensive integration of sustainability concerns in all the courses across. The ESD framework has five components (issues, values, knowledge, skills and perspectives).

b. Modification of the curriculum when need arises. Sustainability issues are emerging issues, a programme is not fixed.
c. Inclusion of sustainability in the professional development of leaders and educators within the teacher education system.
d. Inclusion of sustainability in: all the daily operations of the college, mission statements, strategic plans, examination goals, methodology courses, teaching practices, research, continuous assessment and action projects.
e. Development of a policy on ESD and establishment of a committee

5.5.4 Greening Non-Formal Curriculum Activities

According to the observation, the goal of reorienting the teacher education curriculum for sustainability is specific to each institution. It was, therefore, important in this study to find out how the college could contribute to the creation of a sustainable society through teacher education using a whole- system approach. Through content analysis of historical records, it was revealed that, there was a vision and aim that originally led the Christian Council to found the college in 1959 (refer-to 4.3.4). The founding fathers as reflected in the original vision and aim of the college emphasized the following aspects:

i. Offering direct practical activities to the students
ii. Testing every theory, they teach in class during teaching practice
iii. Testing every lesson taught in the chapel in the way they live together as a community in Livingstone and after graduating in every part of Zambia
iv. Promoting the culture of peace
v. Preparing students as teachers as well as leaders in the community
vi. Viewing the preparation of teachers as a shared responsibility
vii. Using participatory teaching approaches
viii. Promoting environmental stewardship
ix. Promoting unity in diversity

This study therefore further suggested the consideration of the unique history and culture of the college in ESD projects. As discovered, most of the historical success stories in the greening of the non-formal and formal education curriculum in the history were as follows:

The first students were determined to make the quality of their lives…They played their part in establishing a new community, working together in small counselling groups to overcome our differences of language, denomination and culture. The students' council, and many committees shared with tutors played a large part in this. Students worked hard in a special session of campus duties by which the grounds were turned from a desert to a park. While other colleges had 'lecturers', we had 'tutors' not to give lectures to class but to be advisors and counsellors, encouraging them to fulfil their full potential. Students were preparing to live as teachers and leaders in their community after training, to be child centred rather than self-centered.

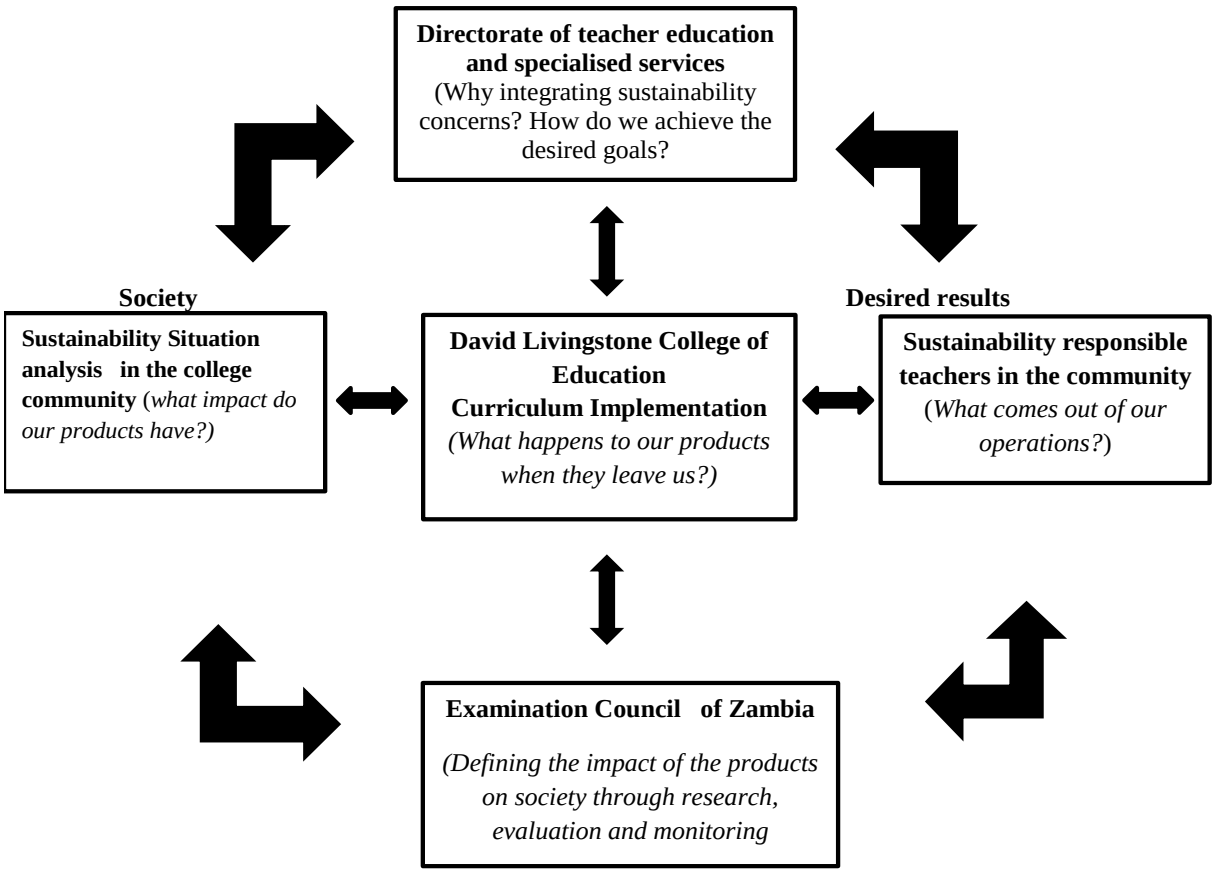
It was a challenge for Christians of different denomination to live and work together in unity. But through Christian Life Council we tried to work a system which openly recognised the differences, and tried to hold them together.

Such successful stories could be the starting point when transforming the whole colleges towards sustainability. According to the findings, it was the wish of the founding fathers that the current and future generations of students and staff at David Livingstone should not destroy, but build on what was left. The results generally showed that the college needed to work in collaboration with other key stakeholders in developing mechanisms for supporting and reinforcing ESD in the curriculum.

The researcher in this section outlined the potential opportunities for up-scaling the reorientation of the teacher education for sustainability at David Livingstone College of Education within and outside the teacher education system. What came out clearly was that, ESD requires contributions from all the disciplines and sectors because one institution cannot create a more sustainable future. It was also clear that the scaling up reorientation of the teacher education curriculum for sustainability requires a policy with clear guidelines that permit curriculum implementers design and redesign ESD content locally.

4.6 Model for Quality Reorientation

Based on the issues that were raised as presented in (4.3, 4.4 & 4.5), a model was suggested for quality reorientation of the teacher education curriculum for sustainability at David Livingstone College of Education which illustrates a whole-institutional approach as shown below (details on the features will be given in 6.5).



Source: field data 2019

Figure 2: Model for Quality Reorientation

CHAPTER FIVE: DISCUSSION

5.1 Overview

The researcher in the previous chapter presented the findings of this study which was conducted to assess the quality of the reorientation of the teacher education curriculum for sustainability at David Livingstone College of Education. In this chapter, the researcher presented the discussion of the research findings in relation to the literature reviewed and presented in chapter two, transformative theory of learning which framed the study and conceptual frameworks. As indicated in chapter one, this study aligned itself with a holistic approach and the parameters that were used to measure the quality were the guidelines prescribed by UNESCO, the lead agency for the implementation of the GAP-ESD as well as the guiding principles recommended in the 2013 Revised Zambian National Education Curriculum Framework and 'Educating Our Future' the Zambian Policy on Education. There were many themes that emerged from this study, but in this chapter the focus was mainly on those that suggested possible ways of improving the quality of the reorientation of the teacher education curriculum for sustainability.

5.2 Quality of the curriculum content

As a reminder, the first objective was to examine the quality of the curriculum content in reorienting the teaching education curriculum to address sustainability at David Livingstone College of Education. As presented in section 4.2 of the previous chapter, the following were the main themes that emerged from the study:

5.2.1 Inclusion of ESD in the Curriculum

As presented in chapter four (section 4.3), this study through content analysis of the 2013 Revised National Teacher Education Curriculum Framework, revealed that ESD was highly recognized as one of the thirteen major issues of national concern, but the findings through content analysis of the syllabi and course outlines at the college, indicated some weaknesses in the way the ESD curriculum content was selected and designed (refer to 4.3.1). One of the major weaknesses identified was that, there was no shift from the usual traditional disciplinary approach to interdisciplinary view where the social, ecological and economic sustainability dimensions are well balanced across all the disciplines. The ESD content is shaped and given by these three main dimensions of sustainability as prescribed by UNESCO, the lead agency for the implementation of the GAP-ESD. However, as noted in

this study, the ESD content was too low as there was no evidence of all the three dimensions of sustainability in all the disciplines. The social, ecological and economic dimensions of sustainability are a powerful tool for defining sustainability comprehensively. The researcher observed that, the usual disciplinary approach to addressing sustainability problem is partial and invites limited responses to complex sustainability issues that affect learners.

If one of these dimensions of sustainability is weak on the preparation of the student teachers for sustainability teaching, then, the whole process is weak as these dimensions are interrelated and interdependent. For example, a prosperous society (social sustainability) depends on a health environment to provide food, safe drinking water and clean air for its citizens (economic sustainability). Most of the sections of the economy such as tourism, agriculture, food industry, timber and fishing are also dependent on the healthy functioning of the environment (economic, social and ecological sustainability. According to Mckeown, *et. al*, (2002), ESD addresses values, skills, knowledge, perspectives and issues that guide and motivate people to seek sustainable livelihoods, participate in a democratic society and live in a more sustainable manner.

This knowledge about the nature and function of the three main dimensions of sustainability in this study was viewed to be important because teaching professional skills and competencies in ESD depend on this knowledge as what the learners know affects the actions they take. It also empowers learners to appreciate interdependence of professional life which is more sustainable than dependent lives which limit their professional actions and citizen participation. This is closely linked to the description given by Namafe (2006) that, an interdependent teacher is someone who: moves from taking more personal responsibility for his/her life towards accepting a wider sense of social responsibility towards others; values the qualities and abilities of their learners; enjoys teaching using open styles; regularly initiates cross-curricular projects and acknowledges that the best way to learn involves interaction with others and, therefore, begins to value contributions to his learning and teaching from others around him/her.

If teachers were to succeed in a risk society which was a rapidly changing world, they needed to have not only knowledge, but also values, attitudes, skills and competencies for facilitating learning for sustainability in diverse contexts. As suggested, where there is quality in ESD, those involved do not confirm the usual business of academic traditions, but they should examine its potential for creating a more sustainable future. Therefore, this theme suggested a

holistic approach to the development of the curriculum content with an interdisciplinary view and where the social, ecological and economic issues were well-balanced in all areas and forms of education. It also seemed to suggest that the emphasis should be on nature and function of sustainability issues which are interrelated and interdependent.

5.2.2 Low level of Awareness about Sustainability

This study also suggested that those who offer support should acquire necessary knowledge and technical skills needed to drive the ESD processes at all the stages of curriculum development and in all the critical dimensions of the teacher education system. It was so evident that this process required those involved to have knowledge and technical skills for shaping and reshaping the curriculum in ways that would help create a more sustainable future and positive societal transformation. Unfortunately, while it was so evident that ESD was highly recognized as one of the major issues of national concern, low level of awareness among lecturers was raised as a weak theme. Some could not even, identify sustainability themes which were emphasized in the curriculum by curriculum developers. To improve the quality of content, institutions involved in the reorientation of any education curriculum for sustainability had to go through the 'necessary process' and 'practice' what they 'teach' their target audience in their natural settings as recommended (Mckeown *et.al.*,2002).

5.2. 3 Clarification of Competencies and Purpose

The survival of ESD with its interdisciplinary approach highly depends on how it is presented in the instructional materials, examination systems which were centrally controlled and how it is interpreted and implemented. However, it was established that, the target competencies and the purpose were not well-clarified to the target audience who drive the whole process. In this study, teaching competency was perceived as something that makes a teacher feels secure and self-assured as he/she performs the expected duties to reach the best outcomes. It was therefore, suggested that the development of the ESD content should begin with the identification of what the target audience is compassionate about, then, show how it is related to sustainability with the national education vision and aim of the colleges in mind. The researcher agrees with Summers *et.al* (2005) who noted that, the formulation of the teaching competencies in ESD is highly influenced by the culture belief system of the target audience as quality in sustainability involves value judgments.

Quality was found to be a relative concept as the glossary of vocabulary relating to quality and standards in the development of any professional education curriculum in this study included: relevance; responsiveness; professionalism; best practices; excellence; competent; multi-skilled; qualified; knowledgeable, functional literate; expert; partnership competent; interdependent and agents of change just to mention a few (Ministry of Education, 2015, 2015 & 1996 & UNESCO-The Road Map for Implementation of GAP-ESD, 2014 & UNESCO, 2016). As suggested, those involved should target the competencies that make-up applied teaching competencies in ESD and these fall under the following categories: Foundational; Reflective and Practical Competency Areas (Scot, 2002). This is closely linked to the study by Elmose and Roth (2005) in which the following were suggested as key competencies for living in a risk society: Competency to understand and change one's own living conditions; participate in collective decisions and solidary with those who are unable to control their own conditions.

5.2.4 Weaving ESD in the Local Cultural Contexts of College

A presented in 4.3.4, ESD is tied to the local culture and it is a reflection in an institution of the changes currently taking place in society, a means of dealing with such changes through knowledge and skills, and a way of preparing learners to deal with contemporary social, economic and ecological sustainability issues that affect them (United Nations, 1992). Hopkins & Mckeown (2005) also strongly recommended that, decisions about sustainability themes to emphasize in the teacher education should fit the socio-economic and environmental context of their communities, nations and regions. For example, when addressing HIV-AIDS, it was established that, while the government through the Ministry of Health was advocating for the usage of condoms, the college community through informal and non-formal education systems took the abstinence route which fits their cultural belief system.

As observed, the college community has better knowledge about their social, ecological and economic environments, but their interest was not considered. According to the findings, most successful education projects in their history were those that were initiated locally and weaved in the culture of the college. This is in harmony with John Dewey's view that, education should realize a sense of self, a sense of others and sense of community (Dewey, 1916). Environmental sustainability problems are not problems of our surroundings, but-in their origins and through their consequences, are thoroughly social problems, problems of people, their history, their living conditions, their relation to the world and reality, their social, cultural and living conditions

(Irwin, 1995). ESD does not only about 'know', but it is also about 'doing' and valuing. It is through their culture that college community members find their identity and worth (Mckeown and Nolet (2013).

In this section, the main themes that were raised from the study on the quality of the curriculum content in reorienting the teacher education curriculum for sustainability at David Livingstone College of education have been discussed and analyzed. According to this discussion and analysis, quality ESD content is deeply rooted in the culture of the target audience. Therefore, a shift from disciplinary approach to interdisciplinary view where all the three dimensions of sustainability were well-balanced in all the disciplines across the teacher education curriculum was suggested. It was also emphasized that more attention must be paid to the nature and functions of the social, ecological and economic systems in the cultural contexts. The purpose and target teaching professional competencies as indicated must be well-clarified.

In the next section, the researcher discussed and analyzed the effectiveness of the teaching approaches that were being used in reorienting the teacher education curriculum for sustainability.

5.3 Effective Teaching Approaches

The second specific objective was to assess the effectiveness of the teaching approaches that were being used in reorienting the teacher education curriculum for sustainability at David Livingstone College of Education. The results indicated that education for sustainability required a choice of varied teaching approaches adapted to the audience, learning objectives and content. In this section, the researcher centered discussion on the main themes that emerged from the study and as presented section 4.4, these were: the indigenous, participatory and field based teaching approaches.

5.3.1 Indigenous teaching approaches

Indigenous teaching approaches in this study are ways of doing things or passing on skills and technologies down generations through experience. These teaching approaches were the least used in formal education processes, but the results of this study showed that, case studies, stories, proverbs, music, drama and poetry were effective for preparing students for sustainability teaching. These approaches allowed students to learn through experience and situate learning in the local contexts. According the observation, such democratic learning environment enable learners to venture out of the rigid traditional education walls that regard

the knowledge acquired outside the classroom as invalid. When educators used the indigenous teaching approaches, such as proverbs, drama, poetry and songs they considered using the language which was commonly used by learners and people in the community. This did not simply focus on passing knowledge, but also allowed learners to work together with educators to acquire knowledge and play a role in transforming their world.

The strength of these approaches such songs, poetry and drama lie in the fact that, when the circumstances change, they also evolve and were found to be suitable for conveying knowledge, values and principles associated with sustainability in the local cultural contexts. Additionally, learners were also being socialized in practices associated with cultural values, knowledge and these approaches as observed attracted a number of learners as the college choir, as well as their drama troupe performed on events such as graduation ceremony and when visited by prominent figures. Real sustainability Knowledge as presented in the previous section is deeply rooted in the cultural of the people being served, it is historically defined and tasks as it focuses on meeting the real needs of the target audience. In other words, it is learner-centered as observed by (Simasiku, 2011). The only challenge noted was the question of how to link the non-formal learning activities to certain emerging ESD themes such as climate change which were not well defined in the cultural contexts.

5.3.2 A variety of participatory and field-based teaching approaches.

As presented, (4.4.2 & 4.4.3), ESD required input from a variety of people with experience and expertise and this included all those who are interested in finding best solutions to social, economic and ecological as well cultural issues that affect society. Some of the participatory teaching approaches which were being used included: group work, project, research, problem-solving, presentations, discussion and debate during clubs, brain storming and report writing. These teaching approaches were being used when teaching Content Courses (areas of specialization) and it was discovered that, they were more effective than the lecture method which was frequently used when teaching professional courses. It was also clear that when the learning and teaching processes are interactive and participatory, it is easier to learn the teaching skills than when the information is received passively from lecturers.

Such approaches allowed them to actively contribute to the teaching and learning processes as they shared information, learnt from each other and worked together to solve sustainability problems. As noted through interviews, skills acquired through participation are life long-long skills such as: skills for creative and critical thinking, oral and written communication,

collaboration and cooperation, conflict management, decision –making, planning and problem-solving. Teachers with such skills were needed to effectively facilitate learning for sustainability in any situation especially that the products of that college were destined to work and live as professionals with social responsibilities. This theme is similar to the findings of the study conducted by Roarda (2001) which revealed that, effective teaching approaches are those that contribute to the development of critical thinking skills, the capacity to make informed decisions, a sense of responsibility, respect for the opinion of others and integrated problem-solving skills among learners.

Without such skills, the student teachers would learn and work within the limits of the skills and knowledge received from instructions alone. Preparation of student teachers for sustainability teaching is more than academic and it is planned in ways that benefit the audience. Through the GAP-ESD, there was also a global call for adoption of action competency-teaching approaches which pointed to the democratic participatory and action-oriented teaching-learning approaches. These help the learners develop the ability, motivation or desire to play an active role in finding democratic solutions to sustainability issues**.** In this study, action is associated with sustainable life-styles or behaviour, life-skills, customs and learning activities. While competency is associated with capacity and willingness to actively participate in addressing sustainability issues in society as teachers with social responsibilities (Weinert, 2006).

In this section, the researcher discussed the effectiveness of teaching approaches that were being used to reorient the teacher education curriculum for sustainability at David Livingstone College of Education. This required a shift from teacher centered to student – centered teaching approaches, and from rote memorization to a variety of information, active and competence-based teaching approaches. According to the analysis, such approaches allowed students to go through a complete process of learning for sustainability. As indicated, ESD did not only require the teaching approaches that simply focused on passing knowledge, but also those that allowed learners to work together with educators to acquire knowledge and play a role in shaping the environment of their educational institutions.

5.4 Opportunities for Scaling-up ESD

The third specific objective centered on the exploration of the opportunities that existed in the reorientation of the teacher education curriculum for sustainability. As presented in the previous chapter (section, 4.3, 4.4 and 4.5), the potential opportunities for scaling-up

reorientation of the teacher education curriculum established were discussed and analyzed thematically in the sections that follow:

5.4.1 Political Will

As indicated in chapter one, education policies with regard to environment and sustainability in Zambia just like any other country have been inspired by international agreements and an inherent concern for the protection and conservation of the national social, ecological and economic environment (s). However, this study was located in the influenced by the two overall objective of the GAP-ESD which was to promote ESD in all areas and forms of education so as to transform teacher into change agents in direction towards sustainability. According to the findings, the political will in Zambia created conducive atmosphere for those who were involved in ESD related programmes to work freely. For example, sustainability planning could be set within the strategic planning which was the basis for service delivery at all levels education management (Ministry of Education, 2007). Additionally, National planning Documents, such as the Poverty Reduction Strategy, 2002-2004, the fifth National Development plan, 2006-2010 and the Sixth National Development plan,2011-2015, as well as education sector documents such as the 1996 National Policy on Education 'Educating Our Future', the Ministry of Education Sector Plan, 2003-2007, the educational sector implementation framework, 2008-2010 and the Education Sector National Implementation Framework, 2011-2015 all echoed on the need to improve the quality of education (Ministry of Education, 2015).

The government also created College Boards (CBs) as part of the decentralization policy and this was intended to allow more rapid reaction and action to problems and opportunities that occurred at the local level where service delivery takes place (Ministry of Education, 2008). For instance, an hour long session with the College Board, could provide a unique opportunity to project clear ESD message to the pre-service student teachers and lecturers who were identified as key stakeholders in this study. Furthermore, the 1996 National Policy on Education 'Educating Our Future' supported the regular revision of the curriculum which provided actors a wonderful opportunity to keep-up with sustainability educational needs of the target audience whenever circumstances in the social, ecological and economic changed. For instance, in 2013, the teacher education curriculum evolved to the levels of supporting the inclusion of ESD at all levels and the Zambian National Commission for UNESCO also supported these activities technically. The overall vision of the 2013 Revised National

Education Curriculum Reform was 'innovative and productive life-long education and training for all by 2030' (Ministry of Education, 2015 & 2013).

5.4.2 Moving Towards Life-long

The Zambian National Education Aspirations at the time of this study were: access for all to, good quality basic human necessities such as education facilities, diversified education curricular, values, attitude and practical skills needs of individual and society as a whole, improving education attainment and eliminating gender gaps (Ministry of Education, 2015). Although it was so, most of the weak points raised demanded the need to create opportunities for teacher education developers, learners and teacher education system as a whole to move away from the global markets that promoted international competitiveness in education to a more holistic approach to teacher education curriculum development. Quality reorientation of the teacher education curriculum for sustainability becomes real when it is adapted to the classroom, correctly interpreted to learners and when it responds to sustainability issues in the local cultural contexts as stated (Marzano, 1997).

Educational in the 21st century was not anymore viewed from a narrow way, but as a life-long perspective built on the pillars of*: learning to be, learning to do, learning to live with others* and *that* is learning to *live together sustainably* and from the ESD lens, learning to *transform self* and *society (*Delors, 1996). As a life-long learning process, ESD as noted should not be judged from a narrow perspective as it has to do with formal, informal and non-formal forms of learning. This required all to learn new ways of being the change that was required in the transformation towards sustainability. Given the diversity of the contexts of the social, ecological and economic sustainability issues to which the target audience responded to, actors at all the stages of curriculum development, needed to learn and discover new ways of maximizing benefits of ESD processes. As Sterling (2004) noted that, in order to achieve sustainability, there was need for 'a third thinking', namely 'transformative learning' or 'epistemic learning'.

In a very real sense, reorientation of any professional education curriculum is a shift away from traditional educational practices that hinder progress towards sustainability which requires a holistic approach. For example, at implementation level, scaling-up ESD required a specific policy with clear implementation and management guidelines as it makes it easier to monitor, implement, evaluate and to project a clear message of what sustainability means to the teacher education and key stakeholders. It was so clear that actors at all levels needed

such guidelines in their departments as they labored to respond to the following suggested basic questions raised: do we really need sustainability concerns in our operations? If so, what should we do? What impacts do we have on our community? What do we get from our community and what do we give to it? What comes out of our operations? What happens to our products when they leave us? What is the positive impact of our products over their professional life span?

5.4.3 In the Examination System

Although assessment of students was centrally controlled by the Examination Council of Zambia (ECZ) through the final theory examinations, opportunities for scaling-up sustainability practices through Continuous Assessments (CA -50%) were established. As suggested, in courses such as Teaching Practice I, Teaching Practice II, Education Research I and Education Research II (weighting 100%) which were locally examined, assessment tasks which test the understanding and ability were carried out. These included tasks such as essays, action projects, research reports, presentations which required depth thought and original work done by the student. As a life-long, holistic and inclusive process as indicated in this study, the lecturers felt that, day to day work of a student was the most important part of the eventual assessment of learners in ESD. If the 2013 was designed to be learner-centered and competence-based there was need to make the assessment a learning process.

For instance, learning how to apply the new ESD concepts to particular facets of their work or home life required a broader vision. As noted in the findings, students did not take non-examination education programmes seriously. Continuous assessment as revealed is learning process and if sustainability related programmes or topics integrated are not examined, Roarda, (2001) observed that, students may get the impression that sustainability issues and activities are a kind of secondary consideration.

5.4.4. Greening Non-formal curriculum Activities

It was further discovered that special events which were under the control of the institution system but outside the regular class structures were potential opportunities for disseminating sustainability related information. For example, administrators, resource persons or guest of honors could spare time to talk about the need for social, economic or environmental sustainability practices during social events like sports, graduation day or tutorial time. A resource person could also be called to address students on sustainability issues that affected

them or the community, such as political violence; HIV-AIDS; Poverty; Climate Change and many others. Other events established were: seminars, workshops, interdepartmental events, motivation talks or key-note addresses, presentations debates, and observing environmental days (world environment day 5 June).

Subject associations and other social networks were also established as a potential opportunity for scaling-up reorientation of the teacher education curriculum for sustainability. For instance, the Christian Council which was made of representatives of the various denominational groups both from staff and students were using such strategies to foster the Christian Life in the College at the time of the study. Partnerships and networking at the college emerged as a norm, as the college was founded by partners (Christian Council of Churches) who successfully worked together for over 50 years (refer 3.2-background of the college). In the teacher education circles, the college had well established networks and partnerships like the Norwegian University of Science and Technology which was offering post-graduate professional development courses, particularly in Numeracy and Literacy to lecturers and serving teachers in Livingstone district. The interview with the College Administrator revealed that, plans were under way to introduce new programmes. Using the existing structures was also found by Nolet, (2009) to be one of the strategies for scaling-up ESD colleges of education as saves time, a valued resource.

There were also potential partners at Regional level such as The Southern Africa Regional Curriculum Innovation Networks which connected universities with external stakeholders in promoting the integration of sustainability concerns in the curriculum and the International Network of Teacher Education Institutions associated with the UNESCO chair on reorienting teacher education to address sustainability. This network comprised teacher education institutions from about 60 nations around the world and member institutions worked to incorporate sustainability. Additionally, the Zambian Commission for UNESCO, the lead agency in the implementation of the GAP-ESD and the Zambian Network of Teacher Education Institutions for Mainstreaming of Sustainability which was formed in 2010 and operated freely in carrying out ESD related programmes in colleges of education.

As revealed through content analysis of UNESCO international reports, actors in the process of reorienting the teacher education curriculum for sustainability through networks could exchange information experiences, and knowledge and best practices with each other. Lupele (2007) in Southern African Region also showed that partnerships and networking were

important in environmental and sustainability practices. What came out clearly was that, reorientation of the teacher education curriculum for sustainability required contributions from all the disciplines; it is participatory and multi-stakeholder driven. Reflecting critically upon how sustainability issues which affect the communities, work places, families or individuals and being in a position to make appropriate decisions was found to be one of long-term goals of education for sustainability. Non-formal and informal learning activities, had potential to supplement or replace formal educational processes which was academic oriented. These activities were flexible, goal oriented, specific to the needs of the target.

5.5. Model for Quality Reorientation

A model described in this section as indicated is based on the themes that suggested the possible ways of improving the quality of the reorientation of the teacher education curriculum for sustainability (refer to figure 2 on page 42). According to the findings, ESD in the teacher education curriculum seeks to improve the relevance and quality of teacher education, and ultimately through this, the quality of education offered to learners in schools. In the proposed model, teachers are regarded as powerful agents of change for delivering the educational responses to sustainable development, but for them to usher in the transition to a sustainable society they should acquire the necessary knowledge, skills, attitudes, and values**.** It key feature discussed and analyzed below:

5.5.1 Organization of the Curriculum

In the proposed model, the reorientation of the teacher education curriculum for sustainability at David Livingstone College of Education was seen as a regular process of reflecting, reviewing, dialogue and replacing sustainability educational needs of the target audience. Therefore, in the first place, the professional sustainability educational needs must be identified in a natural setting of the target audience and be decided with full involvement of the owners of the curriculum whether it is worthwhile to address the needs. Then comes the step of what has to be done, followed by a study on whether there are any policies and plan that have a bearing on the needs identified. Following that, the teacher education programme with clearly stated vision, aim, competencies, assessment tasks, and teaching approaches in mind must be developed. The reactions of people being served should be included in the sustainability plan and it should answer the questions of how they will benefit and the transformation of pre-service teachers will be done with their full involvement.

5.5.2 Quality Agendas in ESD

Quality in the development of the teacher education curriculum reoriented for sustainability is all about the process itself. This answered the questions of how educational sustainability needs of student teachers were to be identified using bottom-up approach with full involvement of those who were at the grass-root, how they were to be considered during service delivery and how the products were to be supported to develop the interest of being learners throughout their lives as citizens with professional responsibilities across the dimensions of sustainability (UNESCO, 2012). It presented a shift from teacher-centered to learner-centered as it acknowledged the target audience's diverse experiences and knowledge as something that could be shared, built on and used in the transformation of society towards sustainability.

5.5.3 The Purpose and Kind of a teacher (*what comes out of our operations*?)

According to the proposed model, ESD seeks to improve the relevance and quality of teacher education, and ultimately through this, the quality of education offered to learners in schools. Teachers were regarded as key agents of change for delivering the educational responses to social, ecological and economic issues, but for them to usher in the transition towards a sustainable society; it was argued that, they should first acquire the necessary knowledge, skills, attitudes, and values. They should be Knowledgeable about the nature and functions of the social, ecological and economic systems which as it discovered that, this allows them to appreciate the interrelatedness and interdependent of life on earth. Teachers as agents of change have their own practical theories of their work as stated by (Stevenson, 2007b).

5.5.4 Clarification of Sustainability in the local cultural contexts

As a marketing strategy, it was also suggested that the formulation of the target teaching competencies should start with what the community is compassionate about, and then show how it is related to sustainability. The target student teachers' willingness to accept personal and professional sustainability responsibility, as a choice they will make and actions they will take, in this model is viewed as a key trait that should not be ignored in any educational responses to sustainability. Teachers were expected to be 'selfless' in their personal lives and 'child-centered' in their professional lives. From the biblical point of view, teachers of high quality at that college were regarded as stewards and were defined by what they expected to do (accountability and expectations) (Luke 12:481 Corinthians 4:2).

This concept of stewardship is not fixed, but it evolves as circumstances in all the domains of human existence change. Its characteristics include: a great responsibility given to stewards according to their abilities (Genesis 39:4); positions (Genesis 24:38); interrelationships (Genesis 3:33, Hos.6:7). It recognizes that people have a duty of care for the community of (life diversity) for the benefit of all generations and the natural world was given to them, to care for, enjoy and have dominion over (Genesis 2:15). So for their products to accept responsibilities across the social, ecological and economic dimensions of sustainability, the proposed model suggested that, ESD must be interpreted and presented to them as something which was more basic and essential in helping them graduate with an understanding that, change towards sustainability was part of their teaching career lives and it was inevitable. Sustainability issues are real and, as they emerge, they affect everyone and, usually bring challenges, temptations and fear. Therefore, those involved, as suggested in the proposed model, should not instill fear, but give them hope for a more sustainable world.

5.5.5 Societal Expectations

The pre-service student teachers at the time of this study were being prepared to live and work in a risk society which demanded from them competency areas which involved a reflection and debate on ethical principles and values underlying teachers' work and acting in an ethically responsible manner in different environments taking responsibility to facilitate the transformation of learners in schools and communities towards sustainability (Namafe, 2006). At pre-service level, student teachers were expected by the Zambian society to 'pursue a vigorous and sustained critical evaluation of society's past and present achievements and chart the possible directions for future developments,' as reflected in Educating *our Future*, the Zambian National Policy on education of 1996 (Ministry of Education,1996:91). They were also expected to graduate with an understanding of ESD and other issues of major issues of national concern which included: Environmental Education, Special Education, Life-skills, governance, Gender, Human rights, Guidance and Counseling, Entrepreneurship Education, HIV-AIDS, Health, Information and Communication Technology (ICT), population and Computer Studies. The emphasis in the proposed model was placed on the creation of democratic environment which allowed meaningful dialogue, reflection and improvement to take place in the natural environment of the learners. As argued in this study, for any ESD innovation to succeed, there should be an on-going support.

Teaching in the 21st century was not anymore seen as transmission of usual theories or facts to the learners, but as more comprehensive, multifaceted and complex phenomenon as observed by (Khan, 2012). In the perspective of Mckeown *et.al*, 2002), the central aspect to achievement of the transformative goal of ESD, was an understanding of your own values, the values of society you live in and others around you. This, as stated, enhances environmental stewardship and increases the nation's options for social, ecological, political and economic sustainability. In the proposed model, it also seemed to increase relevancy to the questions of the teaching professional competencies in ESD and they may be acquired by the pre-service student teachers as well how ESD should occur in the formal, non-formal and informal educational processes.

5.5.6 Formulated Competencies

As discovered, ESD was deeply rooted in the culture of the people that were being served and educational responses to sustainability invoked the ideas of conversation, dialogue and debate. The researcher therefore, formulated specific teaching professional competency areas which fit the cultural of the college and they fall under the three categories namely: Foundational; Reflective and Practical Competency Areas. These categories make-up applied teaching professional competencies and it is supported by Summer,*et.al* (2005). The formulated competencies were as follows:

1.**Facilitation Competence:** It involve planning, creation, implementation and evaluation of education offers in ESD which changed the role of the teacher from being a teacher to being a facilitator. This creates an environment where both the teacher educators and student teacher learn to search for sustainability knowledge and acquire skills needed for their sustainable responsibilities.

Cultural diversity competence: Utilizing real-life situations to facilitate learning for sustainability in schools and community. Ability to sustain, understand and learn better ways of being, relating, behaving, acting and believing which differ according to the contexts, history and tradition within which teachers and learners live out their lives in a risk society;

2) **Christian Obligation Competence:** This is to recognise that Christian principles, practices, identity and values of teachers play a significant role in setting directions and building commitment to relationships in their daily operations in a risk society;

3). **Collaborative Competence**: This is the ability and skill to work individually and collectively in resolving the existing and emerging social, ecological and economic sustainability challenges in schools and community. It also includes: interdisciplinary or integrated approach, participatory teaching approaches, networking and partnering;

4) **Sustainability Competence**: An understanding of function and nature of the social, ecological and economic spheres of sustainability and translation of this understanding into action for sustainability of these systems through education.

In this chapter, an attempt was made to discuss and analyze the quality of curriculum content, effectiveness of the teaching approaches that were being used, opportunities that existed for scaling-up ESD in all areas and forms of education and the key features of the model which was proposed for quality reorientation of the teacher education curriculum for sustainability. In the next chapter, the researcher presents the conclusion, recommendations and possible areas for future research.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Overview

In the context of the GAP-ESD, the researcher in the previous chapter discussed and analyzed the main themes that emerged from this study that investigated the quality of the reorientation of the teacher education curriculum for sustainability at David Livingstone College of Education in relation to the conceptual framework; transformative theory and literature related to this study. In this chapter, the researcher presented the summary of the main research findings and recommendations. In addition, some of the areas that might require further research to improve the quality of the reorientation of the teacher education for sustainability were also suggested.

6.2 Conclusion

As presented, discussed and analyzed, there were many themes that emerged from the study mainly aimed at assessing the quality of the reorientation of the teacher education curriculum for sustainability. There were four specific research questions that guided this investigation and the quality of the reorientation was measured using the parameters prescribed by UNESCO, the lead agency for the implementation of the GAP-ESD and guidelines and standards which were stated in the 2013 Revised Zambian Teacher Education Curriculum Framework, but in the local cultural contexts of the David Livingstone College of Education. The results were as follows:

6.2.1 Quality Curriculum Content

The first objective of this study was to examine the quality of the curriculum content in reorienting the teacher education to address sustainability at David Livingstone College of Education. According to the findings, efforts were made by the Zambian Ministry of Education to reform the teacher education in the direction towards sustainability as ESD was highly recognized in the 2013 Revised Teacher Education Curriculum as one of the thirteen issues of national concern. However, this study established that the quality of curriculum content was too low to sufficiently prepare the pre-service student teachers for sustainability teaching in Junior Secondary Schools. In order to improve the quality, this study suggested that, the ESD themes emphasized in the curriculum should be shaped by the three pillars of sustainability which were the social, ecological and economic in all the disciplines across the teacher education curriculum. The emphasis as indicated should also be on the understanding

of the interrelatedness and interdependence of these life-support systems. As discovered, addressing problems occurring in one of the dimension without considering the other dimensions of sustainability is a partial and incomprehensive approach to solving the identified sustainability issues through education. ESD involved building the capacity of student teachers as change agents on relevant issues related to sustainability, as well as teaching and learning methodologies. The idea of teaching for sustainability was to go beyond the usual classroom boarders as established, but the interviews with lecturers and students indicated that students were not adequately prepared for sustainability teaching as there was no major shift towards interdisciplinary approach where the social, ecological and economic dimensions of sustainability are balanced for pre-service student teachers to graduate with appreciation of the interdependence of life and dangers of not managing the web of life well. It is this understanding, as discovered that provokes learners to take-up actions for sustainability.

6.2.2 Effectiveness of the teaching approaches

The results suggested the combination of indigenous teaching approaches with theory-based, action oriented and field-based approaches made learning for sustainability more meaningful, interesting and inviting. As revealed, effective teaching approaches according to the findings are those that: moved from teacher centered to student centered and from rote memorization to participatory learning. Generally, such teaching approaches were problem oriented, place-based and lead to the development of skills needed for action taking. It was so evident that, the lecture which was the most frequent used teaching approach did not provide student teachers with many learning opportunities as ESD is highly participatory and the teaching competencies as noted are acquired through practice. This study therefore, suggested the consideration of both theory and practice in the preparation of student teachers for sustainability teaching.

6.2.3. Opportunities for Scaling up Reorientation

Based on the interviews, observation and content analysis of the relevant documents, a number of potential opportunities were established for scaling-up the reorientation of the teacher education curriculum for sustainability at David Livingstone College of Education. These were: political will at all levels, development of a specific policy on ESD with clear guidelines, training of actors; development of strategies which involved designing of sustainability management tools; introducing ESD as a separate course, balancing

sustainability content in all the courses, networking and partnerships. The study also emphasized the need to integrate ESD into method courses as well as in teaching practices. Exploitation of such opportunities however, required whole-teacher education system approach as the planning and designing of the teacher education curriculum which was reoriented for sustainability was highly centralized. This restricted the college opportunities to provide their student teachers with education which was adapted to the specific needs in their cultural realities.

The overall conclusion of this study was that, the reorientation of the teacher education curriculum for sustainability was not effective at David Livingstone College of Education. As revealed the curriculum had gaps in the main aspects of the curriculum and the major ones were in the selection of the sustainability content, creation of spaces of learning, assessment criteria and the teaching approaches. To improve the situation, a model which suggests that the process should start with sustainability clarification of the purpose and target competencies in ESD was suggested. A numbers of points which suggested the need to decentralize ESD, to the local to the college where those close to sustainability educational needs of the students could be fully involved were raised and considered in the proposed model.

6.2.4. Model for quality Reorientation

Based on the themes that suggested themes the possible ways of improving quality, the fourth objective focused on the development, an ideal model for the reorientation of the teacher education curriculum for sustainability was proposed in this study. The strength of the model proposed in this study was that, it was the product of the identified and felt needs. It did not confirm traditional education practices that socialized pre-service student teacher into unsustainable practices that alienated learners from real social, ecological and economic issues of their existence, but examines the potential such practices in promoting ESD more actively in all areas and forms of education. Quality reorientation of the teacher education curriculum for sustainability as suggested in this study should be viewed as regular process of replacing, reflecting and improving sustainability practices. The proposed model as illustrated, started with the identification of sustainability needs of the target audience, it touched all the critical dimension of the teacher education system and reached the community.

6.3 Recommendations

In addition to the suggested model, the researcher made the following recommendations based on the discussions and analysis of the findings.

a. The Ministry of General Education should develop a specific policy on ESD with clearly stated guidelines (refer 4.4)
b. The Ministry of General Education should also consider training and retraining the teacher educators and other key stakeholders who offer support in the reorientation of the teacher education curriculum for sustainability (refer 4.4).
c. The Ministry of General Education should pay particular attention to the nature and functions of sustainability issues when selecting the curriculum content, teaching approaches and assessment techniques (refer 4.3).
d. The Ministry of General Education through Curriculum Development Curriculum (CDC) should consider involving of ESD specialists throughout the process of reorienting the teacher education curriculum for sustainability as it is too technical to be handled by those without an understanding (refer to 4.3)
e. The Ministry of General Education should make the process of reorienting the teacher for sustainability participatory and learner centered at all levels of the teacher education management (refer to 4.2).
f. The Government of Republic of Zambia through the Ministry of General Education should clarify the goal, aim or vision of ESD to all those involved in the process of reorienting the teacher education for sustainability (refer to 4.4).
g. The Ministry of General Education should consider communicating ESD initiatives to the wider audience within the education system who drive the process of reorienting the teacher education curriculum for sustainability (refer to 4.4).

6.4 Proposed Areas for future Research

Based on the findings of this study which investigated the quality of the reorientation of the teacher education curriculum for sustainability at David Livingstone College of Education, the researcher found it necessary to propose the following as potential areas for future research:

a. Targeting the society, students and the community who are the beneficiaries of the teacher education curriculum which is reoriented for sustainability. This can help to build a comprehensive understanding of their needs or aspirations.

b. An investigation on the use sustainability management tool at all the stages of curriculum development for improving the quality of the reorientation of the teacher education curriculum to address sustainability.
c. Reorientation of the in-service teacher education programmes for sustainability

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APPENDICES

Appendix I: Letter of consent for participants

Dear Participant,

I am a student at the University of Zambia reading for Master of Education in Environmental Education. This research is a major requirement for me to complete the programme.

I wish to investigate the effectiveness of reorientation of the teacher education curriculum for sustainability at David Livingstone College of Education.

The data that shall be collected from this research will be treated with confidentiality. Your rights will be respected and protected.

Finally, you are requested to sign this form to indicate that you volunteered to participate in this exercise.

I have read and understood this document. I therefore agree to participate in this discussion.

Signature: …….

Title: ……

Appendix II: Observation checklist for investigating the effectiveness of teacher education curriculum for sustainability at David Livingstone College of Education.

Key aspects which were checked: the quality of the content (part 1), teaching approaches (part 2) and potential opportunities for up scaling sustainability (part 3) at David Livingstone College of Education.

Part 1	**RESEARCH QUESTIONS AND THE KEY ASPECTS**	**RATING LEGEND** **1. included as prescribed** **2.included but not as prescribed** **3. not included**		
		RATING		
		1	2	3
1	**How is the quality of curriculum content in reorienting teacher education towards sustainability at David Livingstone college?**			
a.	Is the content of sustainability shaped by the three pillars of sustainability (social, economic and environment/ ecological)?			
b.	Is the content of sustainability in all the disciplines focusing on the interrelatedness and interdependence of the three pillars of sustainability?	1	2	3

c.	Is the content relevant to the current needs of the prospective teachers and society at large?			
d.	Are values such as democracy, non-violence and culture of peace as well as an ethic of personal responsibility towards, and stewardship of all the aspects of the natural environment reflected?			
e.	Are social, economic and ecological sustainability Emerging issues such as entrepreneurship and climate change included in the formal curriculum in all the courses?			
	Is there any integration of life-long learning skills in the teacher education curriculum?			
f.	Are students being empowered to contribute actively to sustainability in education and training processes?			
g.	Are students familiar with ESD concepts such as sustainability, sustainable development, sustainable development goals, social, economic and ecological sustainability, sustainable life-styles, sustainable livelihood……?			
h.	Do they go beyond awareness and knowledge?			
i.	Is indigenous knowledge system being promoted			
	in all the areas of specialization?			
	Other observations on the effectiveness of content…..			

2	**How effective are the teaching approaches in reorienting teacher education towards sustainability?**	1	**2**	3
	Effective teaching approaches provide the following skills;			
	a .high quality action oriented and transformative learning			
	b. creative and innovative learning			
	c. Problem-solving skills			
	d. Managing change(identifying and investigating issues, seeking, implementing and evaluating solutions)			
	e. Critical thinking			
	f. Skills to put sustainability into practice			
	g. Collaborative decision- making			
	h. Have they adopted teaching approaches such as problem-solving, action competence learning, case studies, field trips, project, story -telling, action learning, indigenous methods, collaborative methods, use of role plays, drama, artifacts, posters, models, group discussions? Are these methods transforming learners towards sustainability?			
	Other observations on teaching approaches……			
3	**What Opportunities exist for up scaling sustainability at David Livingstone?**	1	2	3
	a. Learning for sustainability through formal, informal			

	and non-formal activities			
	b. working together to create locally and culturally appropriate education			
	c. Partnering and networking			
	d. Roles of students as change agents and leaders in their community			
	e. Local sustainability plan development and management			
	F. Cultural exchange programs			
	f. Subject associations and sustainability			
	g. Talking compounds in and outside classrooms	1	2	3
	h. sustainability information sharing			
	I Establishment of a working committee to spearhead Sustainability related activity			
	J. Sustainability related projects(ie tree planting, raising awareness, article writing to the local newspapers)			
	K. Sustainability aspects reflected in mission statements, motto, policies and strategic plans			
	L. Participation in sustainability related short courses, seminars, meetings (ie Continuous professional development			
	M. Introducing ESD course for all students first year students at DALICE			
	Any other observation……..			

Appendix III; Semi-structured interview guide for -Directorate of Teacher Education and Specialized Services Officials and DALICE Administrators.

Research question 4: How can a model tool for effective reorientation of teacher education curriculum towards sustainability at David Livingstone College of Education be developed?

1. Which actions has the Ministry of General Education taken to fully mobilise the potential of ESD and enhance learning opportunities for sustainability in Zambian colleges of education?
2. How do you develop policies that support reorientation of teacher education towards sustainability in colleges of education?
3. Is there any model tool that has been developed to guide the whole process of reorienting teacher education towards sustainability at National levels?
4. What is your general comment on the whole process of reorienting teacher education curriculum towards sustainability in Zambian colleges of education?

Appendix IV: Semi-structured interview guide for Heads of Department and Lecturers at David Livingstone College of Education

Research question1: How is the quality of the curriculum content in reorienting teacher education towards sustainability at David Livingstone College of Education?

1. How is ESD delivered in your department?
2. Which themes of sustainability have been included in the courses being offered in your department?
3. Which African or Zambian cultural aspects do you think should be included in the teacher education curriculum?
4. Which components of sustainability in the courses you offer you feel are no longer relevant to the needs of the prospective teachers and society as a whole?
5. In your opinion, which local social, economic and ecological sustainability issues do you think should be included in the courses being offered in your department?
6. How can your department generally, contribute to the production of teachers with social, economic, political and ecological sustainable responsibilities?

Research question 2: How effective are the teaching approaches being used by lecturers in reorienting teacher education towards sustainability?

1. Which teaching approaches have you adopted in your department to help students acquire skills such as; interdisciplinary thinking, creative thinking, innovative, team working, problem-solving, investigative, critical thinking, collaborative decision making… needed to put sustainable development into practice?
2. Which indigenous teaching approaches have you adopted to enhance the transition towards sustainability?
3. How is your department instilling in the student's values, attitudes, behavior and life-styles needed for sustainable living and their future roles as teachers?

Research question 3: What potential opportunities exist for scaling up sustainability at David Livingstone College of Education?

1. What are some of the potential opportunities in your department that exist for scaling up sustainability?
2. In which learning activities can sustainability aspects be incorporated?
3. Which clubs in your departments focus on social, economic, ecological and cultural sustainability aspects?
4. Which actions do you think should be taken to fully mobilise the potential of ESD and enhance learning opportunities at David Livingstone College of Education?

Research question 4: How can a model tool be developed for effective reorientation of teacher education curriculum for sustainability?

1. What criteria did you use to select sustainability aspects that you have included in your teacher education curriculum?

2. When reorienting teacher education towards sustainability, which factors did you consider?

3. How do you ensure that the sustainability policies, plans or activities that you have designed support reorientation of teacher education towards sustainability?

3. Which stakeholders do you involve when reorienting your curriculum towards sustainability?

4. What is your general comment on the way reorientation of teacher education towards sustainability is done at David Livingstone College of Education?

Appendix v: Semi-structured interview guide for students at David Livingstone College of education: To investigate the effectiveness of reorientation of teacher education curriculum towards sustainability at David Livingstone.

Research questions 1: How is the quality of the curriculum content in reorienting teacher education towards sustainability at David Livingstone?

1. When you hear the term 'sustainable development' what comes in your mind?
2. How relevant is ESD to the needs of the Zambian?
3. Which Zambian cultural aspects do you think are important to the present and future generation?
4. How can the skills that you have acquired in your areas of specialization help you to participate in resolving environmental problems?
5. How has the knowledge that you have acquired at this college help you to change your life-style?
6. How can the education that you have acquired help you to positively contribute to the economic development of the Nation?

Research question 2: How effective are the teaching approaches used by lectures in reorienting teacher education towards sustainability?

1. Which teaching approaches do you think are the most effective in facilitating learning for sustainability?
2. Which indigenous ways of learning do you think can help you understand the concepts that you have learnt in your areas of specialization?
3. How best do you think you can learn for sustainability in your area of specialization?

Research question 3: What potential opportunities exist for scaling up sustainability at David Livingstone College of Education?

1. Are sustainability elements included in formal, informal and non-formal learning activities?
2. Which opportunities are available in your department to enable you contribute actively to sustainable development?

Research question 4: How can a model tool be developed for effective reorientation of teacher education curriculum towards sustainability?

1. Which actions do you think the college should take to provide leadership in promoting sustainability?
2. What general comment can you give on the way you learn for sustainability?